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**Effect of Guard Band** Reduction on Marker Beacon Receiver Performance

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July 1992

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### **EXECUTIVE SUMMARY**

Until December 31, 1989, the 75-megahertz (MHz) Instrument Landing System Marker Receiver was protected by a 74.6 to 75.4 MHz guard band. After this date, the guard band was reduced by 400 kilohertz (kHz) and now extends from 74.8 to 75.2 MHz.

The Federal Communications Commission (FCC) is proposing 10 frequencies in the new 74.6 to 74.8 MHz band and 10 in the new 75.2 to 75.4 MHz band. These new frequencies, with 10-kHz spacing, would be used by low power Part 90 emitters and Part 15 Auditory Assistance devices. The Part 90 equipment would be permitted to radiate 1 watt (W) maximum and the Auditory Assistance devices 0.0012 W maximum in these new frequency bands.

At the request of Washington Headquarters, Spectrum Engineering Division, ASM-500, the Federal Aviation Administration (FAA) Technical Center performed bench tests to determine what effect low power emitters operating with a reduced guard band have on aircraft Marker Receivers.

The tests were divided into three parts: desensitization tests, no-desired signal tests, and selectivity measurements. The desensitization test simulates an aircraft receiving an FAA Marker Beacon facility and the interference simultaneously. This could occur if the interference source is located near the Marker Beacon facility. The no-desired signal test investigated the possibility of a false Marker occurring due to the interference. This could occur if the aircraft was receiving interference but was not over the Marker Beacon. Finally, the selectivity was measured to determine the off frequency signal rejection characteristics of the Marker Receiver.

Four different modulation types were used for the interference: Amplitude Modulation, Frequency Modulation, Pulse Modulation, and Continuous Wave (i.e., no modulation).

Five general aviation Marker Receivers were used for these tests. The interference effect was quantified by measuring and observing both the Marker Receiver tone and lamp indications.

The following are conclusions from these tests:

- 1. Part 90 devices operating at 1 W maximum in these new bands can degrade Marker Receiver performance. Auditory Assistance devices operating at 0.0012 W maximum in these new bands would not affect Marker Receiver performance.
- 2. Pulse Modulation type interference effected all five receivers.
- 3. Pulse Modulation type interference significantly effected three of the five Marker Receivers tested.
- 4. The interference can cause a false Marker to occur.
- 5. Selectivity measurements indicate that Marker performance cannot be predicted based on selectivity alone.

Based on these tests, the following recommendations are made:

- 1. Part 90 device antennas should be vertically polarized to maximize cross polarization isolation with Marker Receiver antennas.
- 2. They should be located at least 2000 feet from any aircraft approach path.
- 3. Frequency Modulated (FM) or Continuous Wave (CW) modulation should be used since they caused the least interference of the four modulation types tested.
- 4. Pulse Modulation (PM) should not be used in these bands. PM affected all the Marker Receivers tested.
- 5. The equipment shall transmit the minimum power required to perform its function and shall not exceed 1 W.

### INTRODUCTION

# PURPOSE.

The purpose of this effort is to determine what effect low power emitters operating in the 74.6 to 74.8 and 75.2 to 75.4 megahertz (MHz) bands have on the 75-MHz Aviation Marker Beacon Receiver.

### BACKGROUND.

Until December 31, 1989, the 75-MHz Marker Receiver was protected by a 74.6 to 75.4 MHz guard band. After this date the guard band was reduced by 400 kilohertz (kHz) and now extends from 74.8 to 75.2 MHz. The Federal Communications Commission (FCC) has recently issued a Notice of Proposed Rule Making (Amendment of Part 90 to Increase the Number of Frequencies in the 72-76 MHz Band for Low-Power Mobile Use, PR Docket No. 91-295) in which they propose 10 frequency assignments in the new 74.6 to 74.8 MHz band and 10 in the new 75.2 to 75.4 MHz band. They will be spaced 20 kHz apart.

The FCC has also issued a draft Report and Order (Amendment of Part 15 to Provide Additional Frequencies for Auditory Assistance Devices for the Hearing Impaired, ET Docket No. 91-150) in which they plan to permit the use of these new frequency bands by Auditory Assistance Devices.

This guard band reduction which freed up 20 frequencies for low power (1 watt (W) or less) commercial use, also increased the possibility of interference to Marker receivers. The Federal Aviation Administration (FAA) Technical Center was tasked by Washington Headquarters, Spectrum Engineering Division, ASM-500, with determining what effect low power emitters operating with a reduced guard band have on aircraft Marker Receivers.

This report details the testing that was performed. These tests were based on requirements and procedures found in United States Standard Flight Inspection Manual OAP 8200.1, Section 219 "75 MHz Marker Beacon" and RTCA Document DO-143, "Minimum Performance Standards - Airborne Radio Marker Receiving Equipment Operating on 75 Megahertz."

### TEST DESIGN

### APPROACH.

Two tests, which simulate the interference conditions an aircraft may encounter on approach, were performed. The first test was a desensitization test which simulates an aircraft receiving an FAA Marker Beacon facility and the interference simultaneously. This could occur if the interference source is located near the Marker facility. The second test investigated the possibility of a false Marker occurring due to the interference. This could occur if the aircraft was receiving interference but was not over the Marker beacon. This will be referred to as the no-desired signal test. In addition, the selectivity was also measured to determine the off frequency signal rejection characteristics of the receiver.

A computer analysis of the proposed new frequencies revealed that they would not combine with themselves or adjacent TV band frequencies to form a two frequency, third order intermodulation product near 75 MHz. In addition, previous tests on communications and VOR/Localizer receivers have shown that third order intermodulation interference is a factor only if the interferers are close to the desired frequency and at a high signal level. Therefore, two frequency, second order intermodulation products were also not considered significant because the new frequencies are low power (1 W maximum) and the second frequency would be at approximately 150 MHz.

For these two reasons, the effect of intermodulation interference on Marker Receivers was not measured.

These automated tests were performed on five Marker Receivers at the FAA Technical Center, in the building 176 lab. For these tests, the desired signal was a 1700-microvolt ( $\mu$ V) (-42 dBm), 75-MHz Radio Frequency (RF) signal which is the minimum RF signal level necessary to satisfy FAA commissioning and periodic Flight Inspection requirements. This signal was amplitude modulated 95 percent by either a 400-, 1300-, or 3000-hertz (Hz) tone. The 400-Hz tone is used to test the Outer Marker (OM) function; the 1300-Hz tone is for the Middle Marker (MM) function; and the 3000-Hz tone is for the Inner Marker (IM) function. This was the RF signal used to determine baseline performance of the Marker Receiver and as the desired signal when the interference is present.

### DESENSITIZATION TEST.

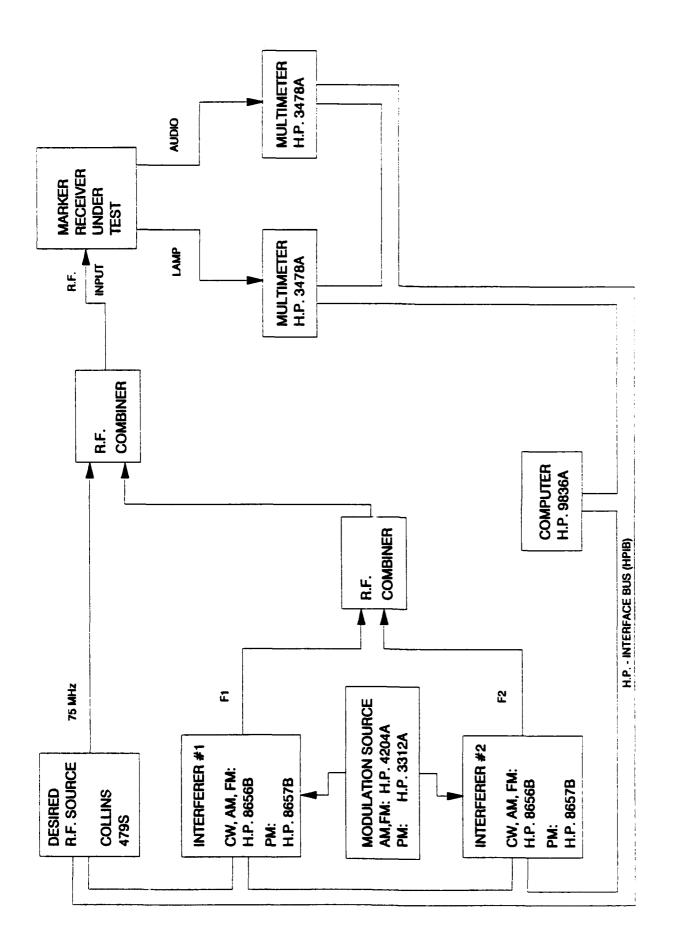
For the desensitization tests, interferer F1 was 74.79 MHz and interferer F2 was 75.21 MHz. These two frequencies are +/- 10 kHz from the edges of the new guard band and will be the closest operational frequencies to the 75 MHz Marker Receiver. By using two interferers, it was possible to simulate interference below the Marker guard band, interference above the Marker guard band, and interference that was simultaneously above and below the Marker guard band.

The desensitization effect was measured by recording the audio and lamp on/off voltages of the Marker Receiver. The audio voltage was used to calculate the Signal-Plus-Noise to Noise ((S+N)/N) ratio (see figure 1).

Distance from the interferers was simulated by varying Fl and/or F2 in 5-decibel (dB) steps from -40 decibels above 1 milliwatt (dBm) to -15 dBm and in 1-dB steps from -15 dBm to 0 dBm.

Since the FCC proposal does not specify a modulation type, these tests used the following types which were considered to be the most likely possibilities:

- 1. Fl and/or F2 were Amplitude Modulated (AM) 90 percent with a 400-, 1300-, or 3000-Hz tone, as appropriate. (For example, when testing the Marker Receiver in its middle Marker mode, both the desired and the interferer(s) were modulated by 1300-Hz tones.)
- 2. Fl and/or F2 were Frequency Modulated (FM) +/- 15 kHz with 400-, 1300-, or 3000-Hz tone, as appropriate.



DESENSITIZATION AND NO-DESIRED SIGNAL TEST CONFIGURATION FIGURE 1.

- . Fl and/or F2 were Pulse Modulated (PM) by a pulse with a Pulse Repetition requency (PRF) of 400, 1300, or 3000 Hz, as appropriate. This produced pulse idths of 1250, 384, and 166 microseconds ( $\mu$ s), respectively.
- Fl and/or F2 were Continuous Wave (CW).

o-Desired Signal Test. The no-desired signal test uses the same test setup, odulation types (except CW), and interfering levels as the desensitization test. ince this test does not use the desired signal, the interference effect could not e measured using the (S+N)/N ratio. However, it could be evaluated by observing he lamp indication and listening for audible interference.

<u>electivity Measurements</u>. Selectivity measurements used only the desired signal nd were performed manually. See figure 2 for the test setup.

TCA Document DO-143 Requirements. Marker Receivers used in the United States must eet Category B requirements of DO-143 which means (among other things) the eceiver's threshold sensitivity is set to Low (1000  $\mu$ V). Marker Receivers, owever, are designed to also meet the Category A requirements (European-editerranean area) which have both a High (200  $\mu$ V) and the Low setting. The High etting is used for enroute operations.

eceiver 1 had only a High and an Auto setting. Its Auto setting provided the Low ensitivity but it also automatically muted the audio allowing insufficient time to easure the audio signal. Therefore, in these tests, receiver 1 used the High ensitivity setting which was not automatically muted. This, however, created a arger margin between the 1700  $\mu$ V desired signal and the 200  $\mu$ V minimum sensitivity hich may produce test bench data that is different from operational use. eceivers 2, 3, 4, and 5 were tested using the Category B Low sensitivity mode.

ategory B equipment does not have a specific selectivity criteria but is instead equired to reject certain spurious emissions caused by frequencies that are not in hese new bands. Category A equipment is required to be 40 dB down at  $\pm$ -200 Hz., i.e., the skirts of the new 74.8 to 75.2 MHz guard band frequencies.

## EST PROCEDURES.

<u>esensitization Test</u>. The desensitization tests used the (S+N)/N ratio and lamp n/off voltage measurement to evaluate the Marker Receiver's ability to detect the esired signal in the presence of interference.

he desensitization tests started with the desired signal turned on and the nterference turned off to establish a baseline measurement of the Marker eceiver's (S+N)/N ratio and lamp voltages. This was followed by (S+N)/N easurements of the desired signal with interferers F1 and F2 on; interferer F1 on nd F2 off; and interferer F1 off and F2 on. For each of these interference onditions, the lamp on/off voltages and the point where the interference became udible were also recorded. These tests were performed for each Marker onfiguration, i.e., OM, MM, and IM.

o-Desired Signal Test. The no-desired signal test began with a baseline easurement of the (S+N)/N ratio, using the desired signal only, to confirm proper eceiver performance. The desired signal was then turned off and the interference urned on. Audio and lamp indications were noted at each interfering signal level or F1 and F2 on, F1 on and F2 off, and F1 off and F2 on.

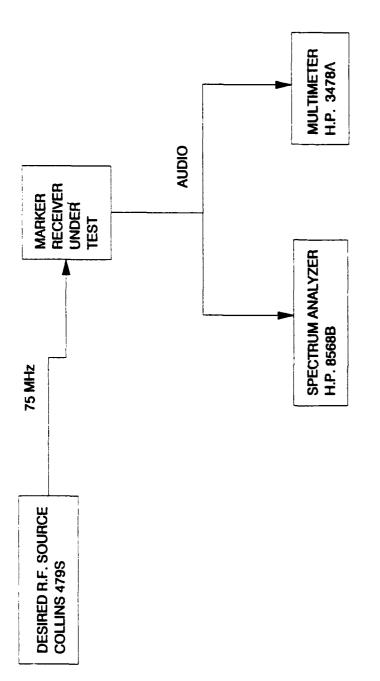


FIGURE 2. SELECTIVITY MEASUREMENT CONFIGURATION

In addition, the tone modulation was turned off at each interfering level to confirm that the effect was due to the modulation and not the carrier. These tests were performed for OM, MM, and IM configurations.

<u>Selectivity Measurements</u>. The selectivity measurements which were made with the desired signal set to a level below which receiver automatic gain control (AGC) action began, were performed at the 6-, 40-, and 50-dB points. This measurement was made by recording the receiver's audio output at center frequency followed by finding the frequency at which a 6-, 40-, or 60-dB increase in desired signal level produces the same audio outpuput level. Selectivity was measured in the MM mode.

### TEST RESULTS AND ANALYSIS

The following analysis will be helpful in comparing these interference measurements to real-world expected interference levels:

Users of the new guard band frequencies will be constrained to 1 W maximum power. If it is assumed that an aircraft will come no closer than 200 feet to an interferer (equivalent to an aircraft in the vicinity of the MM), then the free space loss can be calculated as follows:

Space Loss =  $37.8 + 20 \log F + 20 \log D$ 

Where:

F = Frequency in MHz

D - Distance to interferer in

nautical miles (nmi)

1 nmi = 6077 feet

200 feet = 200/6077 = 0.0329 nmi.

Then,

Space Loss =  $37.8 + 20 \log (75) + 20 \log (0.0329)$ 

= 45.6 dB or approximately 46 dB.

Assuming no shielding, cable, or antenna losses, an FCC Part 90, 1 W (+30 dBm) device will produce, at the aircraft receiver, a maximum signal of:

30 dBm - 46 dB = -16 dBm.

On page 2 of draft FCC ET Docket No. 91-150, it states Auditory Assistance devices are permitted to operate at a maximum power of 0.0012 W (+ 0.79 dBm). At 200 feet, these radiators would produce a signal level of approximately -45 dBm, i.e., 29 dB less than Part 90 devices.

### DESENSITIZATION TESTS.

The desensitization tests measured and recorded Signal-Plus-Noise (S+N) Voltage, Noise (N) Voltage, Lamp On Voltage, and Lamp Off Voltage as a function of interfering signal level. The S+N and the N voltages were used to compute the (S+N)/N ratio. The point at which the interference became audible and any abnormal visual lamp indications were also noted.

In tables 1 through 4, the (S+N)/N ratios as a function of desensitization interfering signal level are tabulated for each interfering modulation type. For example, table 1 shows that for 1300 Hz AM interference, with F1 and F2 on, receiver 4 had an (S+N)/N ratio of 35 dB at an interfering signal level of -5 dBm.

On some occasions, receiver 3 produced (S+N)/N ratios of zero or less. For these conditions, the (S+N)/N ratio was recorded as zero.

Figures 3 through 7 plot the lamp on and lamp off voltages of receivers 1 through 5, respectively for all combinations of Fl and F2. Each figure shows the effect from AM, FM, PM, and CW type interference. For example, figure 3 shows that with AM interference, receiver 1 had lamp on voltages between approximately 2.7 and 3 volts (V) and lamp off voltages of 0 V. The variation in lamp on voltages is due to differences between the Marker Receiver's internal OM, MM, and IM lamp filter circuits. For all receivers except number 5, the lamp on voltage is the more positive voltage. This is reversed for receiver 5. Receivers 1, 2, and 5 used direct current (DC) lamp voltages and receivers 3 and 4 used alternating current (AC) voltages. A tabulation of the lamp voltages shown in figures 3 through 7 is included in appendix A.

DO-143 requires Marker Receivers to have a 15 dB (absolute) (S+N)/N ratio without interference present. It states no criteria for (S+N)/N reduction due to interference from these new frequencies. If, for analysis purposes only, we allow interference to cause an additional 5-dB reduction, then a 10-dB (absolute) (S+N)/N ratio could be used as an arbitrary cutoff point. Further review of tables 1 through 4 reveals that 10-dB or less (S+N)/N ratios exist at interfering signal levels less than the -16 dBm level expected in the vicinity of the MM.

Figures 3 through 7 indicate that lamp voltages are also affected at signal levels below -16 dBm.

Amplitude Modulation. From table 1, with 1300 Hz AM interference, and both F1 and F2 on, receiver 3 experienced an (S+N)/N of 10 dB at -25 dBm (i.e., an interfering signal level 9 dB less than the -16 dBm level expected along the aircraft's approach path). It was also found that at a -16 dBm interfering level, the (S+N)/N ratio of receiver 3 could be as low as approximately 2 dB. These effects were also observed at other combinations of F1 and F2. Figure 5 shows that at -25 dBm receiver 3 lamp on/off voltages also begin to change and by -16 dBm both lamp voltages are erratic, causing the lamp to flash. Only receiver 3 degraded to a 10-dB (S+N)/N ratio and experienced erratic lamp behavior with AM interference levels at or below -16 dBm.

The (S+N)/N and lamp voltages (figure 4) of receiver 2 did not degrade with signals below -5 dBm, however at -4 dBm, in the IM mode, the lamp begins flashing. The interference was audible in both receivers 2 and 3 at interfering levels below that required to produce a 10-dB (S+N)/N ratio and was very noticeable at the 10-dB point.

TABLE 1. DESENSITIZATION EFFECT ON MARKER RECEIVERS FROM AMPLITUDE MODULATED (AM) INTERFERENCE

COLOUR   Marker   Mode)			N/(N+S)			N/(N+S)			N/(N+S)	
(Outer Narter Noche)  400 Nerriz An Interference  F 1 ON F			<b>(9</b> )			<del>(8</del> )			( <del>9</del> 9)	
Fi ON   Fi O	F1/F2		(Outer Marker Mode	2	<b>5</b>	Middle Marker Mod	•		(Inner Marker Mode)	2
FI ON FI ON FI ON FI OFF FI ON FE ON FI ON	Signal	007	Hertz AM Interfer	ence	1300		rence	3000	3000 Hertz AM Interference	rence
FE ON	Level	₹	F. 08	Ξ		i	l		F1 ON	F1 OFF
HECETURE  HECETU	(GBa)								F2 OFF	F2 ON
HECHVER										
4.5         3.4         3.4         4.5 <th></th> <th>Ä.</th> <th>RECEIVER</th> <th>. YER</th> <th>RECEIVER</th> <th>RECEIVER</th> <th>RECEIVER</th> <th>RECEIVER</th> <th>RECEIVER</th> <th>KECE IVEK</th>		Ä.	RECEIVER	. YER	RECEIVER	RECEIVER	RECEIVER	RECEIVER	RECEIVER	KECE IVEK
55         39         37         39         35         39         36         39         36         39         36         39         36         39         36         39         36         39         36         39         36         36         54         39         36         39         36         39         36         39         36         39         36         39         36<	Resel ine	07 67 92 75	S	•  9	77 17 02	27 07 OE	27 17 08	30 33	39 35 51 4	39 35 52 4
52 39 16 39 35         54 38 38 40 38         54 38 20 40 38         54 38 20 40 34         54 39 26 43 46         54 39 27 24 46         55 39 16 24 46         52 39 16 43 46         53 39 28 12 46         52 39 16 43 46         53 39 28 12 46         52 39 10 43 46         57 39 10 42 46         52 39 10 42 46         50 39 10 42 46         50 39 10 43 46         46 39 10 42 46         47 39 11 42 46         50 39 10 42 46         50 39 10 43 46         47 38 10 39 38         49 39 10 43 46         46 39 10 42 46         47 39 11 42 46         47 39 1	9	↓	54 38 42 40 38	8	39 35 43		39 37 42	40 33 51	39 35 51	39 35 52
62 39 16 39 36         52 39 16 43 46         53 39 28 24 66         52 39 16 43 46         52 39 16 24 66         52 39 16 24 66         52 39 16 24 66         52 39 16 24 66         50 39 11 42 46         50 39 1	35		54 38 38 40 38	07	39 26 43		39 29 42		52 39 34 51 48	52 39 29 52 48
46 39 10 40 38         47 38 10 39 38         49 39 10 43 46         46 39 11 42 46         47 39 11 42 46         47 39 11 42 46         47 39 11 42 46         47 39 11 42 46         47 39 11 42 46         47 39 11 42 46         47 39 11 42 46         47 38 12 42 45         47 28 12 42 45         47 28 1	30		53 38 29 40 38	3	39 16 43	39 28 42	39 19 42	39 16	51 39 28 51 48	51 39 18 51 48
45         56         36         56         56         56         36         16         26         36         16         26         36         16         36         16         36         16         36         16         36         16         16         36         16         16         36         16         16         36         16         16         36         36         16         36         16         36         16         36         16         36         16         36         36         16         36         36         36         36         37         37         36         36         36         37         37         36         36         36         37         37         36         36         37<	Ś	49 39 10 40 38	86 05 61 85 95	39	39 10 43	46 39 18 42 46	39 11 42	39 10	87 18 81 68 97	46 38 9 52 48
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45         14         15         14         15         14         15         14         15         14         15         14         15         14         15         14         15         14         15         14         15         14         15         14         15         14         26         14         26         14         26         14         27         0.42         37         11         42         25         24         24         25         24         25         24         25         24         24         25         24         2	-15	×	34 37 12 40 37	1 39	32 1 43	36 12 42	36 1 42	30 2	33 36 14 51 47	36 34 2 52 40
45 21 1 40 35         32 36 1140 37         35 35 0 39 35         44 27 0 42 37         32 34 1142 44         35 35 0 42 37         41 25 2         22 35 1140 34         44 27 0 42 37         32 35 6 42 44         35 35 0 42 37         41 25 2         23 35 6 2 44         35 35 0 42 37         41 25 2         24 35 35 6 42 44         35 35 0 42 37         41 25 2         24 35 35 6 42 44         35 35 0 42 37         41 25 2         24 35 35 6 42 43         34 30 0 42 34         42 2 2 41 32 31         64 24 43         34 30 0 42 34         42 2 2 41 32 31         64 24 43         34 30 0 42 34         42 2 2 41 32 31         64 24 43         34 30 0 42 34         40 20 0         34 30 0 42 34         40 20 0         34 30 0 42 34         40 20 0         34 25 0 42 24         34 25 0 42 23         37 142 31         39 18 2 31         40 20 2         37 18 2 31         40 20 2         37 18 2 31         40 20 2         37 18 2 31         40 20 2         37 18 2 31         40 20 2         37 18 2 31         40 20 2         37 18 2 31         40 20 2         37 18 2 31         40 20 2         37 18 2 31         37 18 2 31         40 20 2         37 18 2 31         40 20 2         37 18 2 31         40 20 2         37 18 2 31         40 20 2         37 18 2 31         37 18 2 31         47 0 37 11         40 20 2         47 0 37 12         47 0 37 12         47 0 37	-14	45 32 1 40 35	33 36 12 40 37	0 39	30 2 43	35 12 42	35 1 42	82	32 34 12 51 46	36 33 0 51 39
46. 29 0 40 34         35. 34 0 39 34         44. 27 0 42 37         35. 35 6 42 37         35. 34 0 39 34         44. 27 0 42 37         35. 35 6 42 43         34. 30 0 42 34         40. 22 0 41 34         31. 31 6 42 43         34. 30 0 42 34         40. 22 0 41 34         31. 31 6 42 43         34. 30 0 42 34         40. 22 0 41 34         31. 31 6 42 43         34. 30 0 42 34         40. 22 0 41 35         31. 31 6 42 43         34. 30 0 42 34         40. 22 0 41 39         31. 31 7 1 42 41         34. 27 1 42 31         39. 16 2 33         30. 22 0 42 24         34. 27 1 42 31         39. 16 2 31         31. 27 1 42 41         34. 27 1 42 31         39. 16 2 31         31. 27 1 42 41         34. 27 1 42 31         39. 16 2 31         31. 27 1 42 41         34. 27 1 42 31         39. 16 2 31 <th>-13</th> <td>31</td> <td>32 36 11 40 37</td> <td>0 39</td> <td>29 0 43</td> <td>34 11 45</td> <td>34 2 42</td> <td>7 92</td> <td>32 33 8 51 45</td> <td>35 31 2 51 37</td>	-13	31	32 36 11 40 37	0 39	29 0 43	34 11 45	34 2 42	7 92	32 33 8 51 45	35 31 2 51 37
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42         22         139         29         139         30         42         20         139         31         27         142         41         34         27         142         31         27         142         31         39         18         28         20         139         31         27         142         31         32         26         040         35         27         039         28         39         18         23         23         03         34         28         31         28         32         26         042         26         34         13         26         040         35         25         039         26         34         13         25         040         35         26         040         36         23         03         26         34         13         26         040         26         34         13         23         14         13         13         14         13         14         13         14         13         14         14         13         23         23         14         16         23         23         23         14         15         14         13         14         16	-10			0 39	22 2 41	29 2 42	28 0 42	20 2	31 27 4 51 40	34 26 0 52 31
36 16 1 36 27         37 26 1 39 26         36 2 36 29         36 2 36 29         36 2 36 29         36 2 36 29         37 26 20         39 26 20         39 27         36 15 3 37 26         36 15 3 37 26         37 26 39 39         35 27 0 42 26         37 12 0 39 39         35 27 0 39 39         36 21 0 40 34         37 26 39 39         36 21 0 40 26         37 13 0 37 36         37 20 0 39 39         38 21 0 40 26         34 12 1 36 26         37 20 0 39 39         38 21 0 40 26         34 12 1 36 25         35 19 0 35 36         36 19 0 39 26         37 17 0 35 25         35 19 0 35 36         36 19 0 39 26         37 10 0 35 25         36 19 0 35 36         36 19 0 39 26         37 17 0 35 25         37 17 0 35 35         37 17 0 38 23         27 7 0           26 7 0 35 23         43 17 0 37 32         45 17 0 39 23         26 6 2 34 22         38 15 0 34 34         39 14 0 37 21         25 5 0           26 5 0 35 23         43 12 0 35 31         45 15 0 39 20         26 6 2 34 22         38 15 0 34 34         39 14 0 37 21         25 5 0           26 5 6 7 0 35 23         39 12 0 35 31         45 15 0 38 20         26 4 2 34 22         38 15 0 34 35         39 16 0 35 31         25 5 0           26 6 7 0 34 22         30 10 0 35 29         35 10 0 35 18         21 3 3 33 20         34 10 0 34 30         37 10 0 35 18         21 2 0 35 27	6-			29 1 39	20 1 39	27 1 42	27 1 42	18 2	31 26 2 51 38	34 24 0 49 29
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33 15 1 37 26         34 2 1 0 40 34         36 23 0 39 26         34 12 1 36 26         33 21 0 37 38         35 21 0 40 56         37 21 35         38 21 0 40 56         34 12 1 36 26         35 19 0 36 36         36 19 0 36 36         36 19 0 39 24         30 10 0 36 36         36 19 0 36 36         36 19 0 39 24         30 10 0 36 36         37 17 0 36 23         37 17 0 36 32         37 17 0 36 23         37 17 0 36 32         37 17 0 36 23         37 17 0 36 32         37 17 0 36 32         37 17 0 36 32         37 17 0 36 37 21         35 5 0 0 36 37 11         37 12 0 34 32         39 14 0 37 21         25 5 0 0 36 37 11         37 12 0 34 32         39 14 0 37 21         25 5 0 0 36 37 12         37 12 0 34 32         39 14 0 37 21         25 5 0 0 36 37 12         37 12 0 34 32         39 14 0 37 21         25 5 0 0 36 37 12         37 12 0 34 32         39 14 0 37 21         25 5 0 0 36 37 12         37 12 0 34 32         37 10 0 35 18         21 2 0 34 21         37 10 0 34 30         37 10 0 35 18         21 2 0 0 34 32         30 10 0 35 29         35 10 0 35 18         21 3 3 33 20         30 16 0 34 29         34 7 0 35 17         20 2 0         20 2 0	-7			0 39	15 3 37	23 0 39	23 0 42	13 0	33 22 0 51 35	35 20 3 42 25
26         9         35         26         10         235         25         25         11         0         235         25         235         23         36         17         0         35         35         17         0         39         22         24         25         235         23         24         25         235         23         24         25         24         25         36         17         0         35         35         17         0         35         25         26         24         23         36         17         0         34         24 <th>9-</th> <th></th> <th>77</th> <th>0 39</th> <th>12 1 36</th> <th>21 0 37</th> <th>21 0 40</th> <th>11 3</th> <th>34 20 0 47 33</th> <th>35 16 0 42 23</th>	9-		77	0 39	12 1 36	21 0 37	21 0 40	11 3	34 20 0 47 33	35 16 0 42 23
26         9         0         34         24         40         19         0         39         23         29         7         23         23         17         0         38         23         27         7         0           26         7         0         34         25         45         17         0         39         22         26         6         23         22         38         15         0         37         21         25         5         0           26         5         5         5         35         35         35         35         37         10         34         35         39         12         33         23         23         10         0         35         19         22         3         23         37         10         0         35         19         23         19         34         10         34         20         34         7         0         35         17         20         2         0         4         0         34         29         34         7         0         35         17         20         2         0         0         34         20	-5			0 40	10 2 35	19 0 36	19 0 39	€0	36 17 0 44 31	36 16 4 41 21
26       7       0.35       23       43       17       0.39       22       26       6       2.4       2       34       36       15       0.36       20       24       2       34       12       0.34       32       39       16       0.35       31       45       15       0.38       20       24       2       34       12       0.34       32       39       12       0.37       19       20       23       3       10       0.35       30       10       0.37       19       22       3       23       23       13       10       0.35       19       20       34       13       33       10       0.35       18       21       3       33       33       10       0.35       18       21       3       33       33       10       0.35       19       10       3       33       10       0.35       18       21       3       33       33       10       0.35       17       20       2       0       0       0       0       0       33       30       0       0       33       10       0       33       10       0       33       10       0 <th>4-</th> <th>٥</th> <th>1</th> <th>0 39</th> <th>7 2 35</th> <th>17 0 35</th> <th>17 0 38</th> <th>7 0</th> <th>39 15 1 43 29</th> <th>37 14 4 41 19</th>	4-	٥	1	0 39	7 2 35	17 0 35	17 0 38	7 0	39 15 1 43 29	37 14 4 41 19
24       5       0.35       23       35       15       0.35       35       15       0.35       20       24       2       34       21       37       12       0.34       21       37       10       0.35       37       10       0.35       37       10       0.35       37       10       0.35       18       21       2       0       33       20       0       35       18       21       3       33       20       0       35       17       20       2       0	-3	7		0 39	6 2 34	15 0 34	14 0 37	~	42 13 1 42 27	38 12 0 41 18
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	0	20 4 0 33 22	30 10 0 35 29	35 10 0 36 18	21 3 3 33 20	- 1	- 1	- 1	31 6 0 40 21	33 6 0 40 13

TABLE 2. DESENSITIZATION EFFECT ON MARKER RECEIVERS FROM FREQUENCY MODULATED (FM) INTERFERENCE

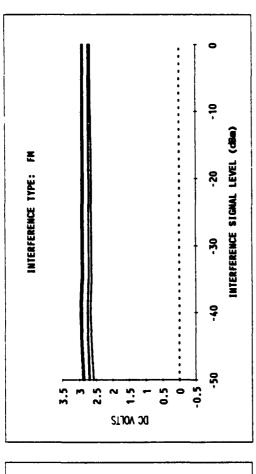
Fig.   Control teach   Contr			N/(N+S)			N/(N+S)			N/(N+S)	
Colorer   Number   No.   Number   No.   Number   No.   Number   No.   Number   No.   Number   Numbe			( <del>g</del> )			( <b>4</b> )	_		( <del>g</del> )	
Fig.	F1/F2		(Outer Marker Mode	•	<b>=</b>	Middle Marker Mod	G		Inner Marker Mode	
FI OM         FI OM <th< th=""><th>Signed</th><th>007</th><th>Hertz FM Interfer</th><th>ence</th><th>1300</th><th></th><th>rence</th><th>3000</th><th></th><th>ence</th></th<>	Signed	007	Hertz FM Interfer	ence	1300		rence	3000		ence
F. C. OH	Level							_		
1   2   3   4   5   3   3   3   3   3   3   3   3   3	(dBm)									
5.3 3 4 5         1 2 3 4 5 5         1 2 3 4 5 5         1 2 3 4 5 5         1 2 3 4 5 5		9575	PETEIVED	43×13/34	PECFIVER	PECETURE		BECFIVE	PECFIVER	RECEIVER
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55 39 36 14 0 38         54 38 44 40 38         54 06 41 65 46         54 39 41 44 46         54 39 41 42 46         53 96 52 46         53 96 52 46         53 96 52 46         53 96 52 46         53 96 52 46         53 96 52 46         53 96 52 46         53 96 52 46         53 96 52 46         53 96 52 46         53 96 52 46         53 96 52 46         53 96 52 46         53 96 52 46         53 96 52 46         53 96 52 46         53 96	Basel ine	×	54 38 44 40 37	3	39 41 45	39 41 45	39 41 42	39 38 50	39 38 50	39 38
55 39 38 40 38         54 38 43 40 38         54 38 43 40 38         54 38 43 40 38         54 39 44 40 38         54 39 44 40 40         54 39 54 42 40         53 40 25 50 40         53 39 35 50 40         53 39 39 50 40         53 39 39 50 40         53 39 39 50 40         53 39 39 50 40         53 39 39 50 40         53 39 39 50 40         53 39 39 50 40         53 39 39 50 40         53 39 39 50 40         53 39 30 50 40         53 39 3	-40	55 39 43 40 38	St 38 44 40 38		40 41 45				39 38 50	39 38
53 39 19 40 38         54 39 34 15 46         54 39 38 44 46         54 39 39 42 46         54 39 34 12 46         54 39 34 12 46         54 39 34 12 46         54 39 34 12 46         54 39 34 12 46         52 39 17 24         62 39 17 24	-35	55 39 38 40 38	54 38 43 40 38	40	39 37 45	39 40 44	39 41 42		39 38 50	30
53 39 19 40 38         51 38 30 40 38         51 38 19 45 36         51 39 114 46         51 39 12 42 46         52 39 12 42 46         52 39 12 42 46         52 39 12 50 40         52 39 12 50 40         52 39 12 50 40         52 39 12 50 40         52 39 12 50 40         51 39 12	-30			9	39 28 45	39 38 44	39 39 42	40 28 50	39 37 50	39 37
50 38 12 40 36         50 38 12 40 36         50 38 12 40 36         50 38 12 40 36         50 38 12 40 36         60 38 12 40 37         60 38 12 40 37         60 38 12 45 45         67 39 16 43 46         50 39 24 42 45         44 39 6 50 46         45 39 12 45 46         50 39 24 42 45         44 39 6 50 46         45 39 12 45 46         50 39 24 42 45         44 38 6 50 46         45 39 75 40 46         45 39 14 46         45 39 14 46 </td <td>-25</td> <td>53 39 19 40 38</td> <td>53 38 30 40 38</td> <td>9</td> <td>39 19 45</td> <td>39 31 44</td> <td>39 33 42</td> <td>8</td> <td>8</td> <td>æ</td>	-25	53 39 19 40 38	53 38 30 40 38	9	39 19 45	39 31 44	39 33 42	8	8	æ
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4.3 3         5.0 32         6.3 3         5.3 4.2 4.5 5         6.3 9         3.4 3.4 5         6.3 9         3.4 3.4 5         6.4 39         3.4 3.4 5         6.3 9         2.2 4.4 5         6.3 9         2.3 4.5 5         6.3 9         2.3 4.4 5         6.3 9         2.3 4.4 5         6.3 9         2.3 4.4 5         6.3 9         2.3 4.4 5         6.3 9         2.3 4.4 5         6.3 9         2.3 4.4 5         6.3 9         2.3 4.4 5         6.3 9         2.3 4.4 5         6.3 9         2.3 4.4 5         6.3 9         2.3 4.4 5         6.3 9         2.3 4.4 5         6.3 9         2.3 4.4 5         6.3 9         0.2 4.4 5         6.3 9         0.2 4.5 5         6.3 9 <t< td=""><td>-15</td><td></td><td></td><td>70</td><td>39 6 45</td><td>39 5 43</td><td>39 24 42</td><td>39 6</td><td>39 7 50</td><td>39 22</td></t<>	-15			70	39 6 45	39 5 43	39 24 42	39 6	39 7 50	39 22
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43 35         46 38         66 38         66 38         66 38         66 38         67 37         67 37         67 37         67 37         67 37         67 37         67 38         67 36         67 38         67 36         67 38         67 36         67 38         67 36         67 38         67 36         67 37         67 37         67 37         67 37         67 37         67 37         67 37         67 37         67 37         67 37         67 37         67 38         67 36         67 38         67 36         67 38         67 37         67 37         67 37         67 37         67 37         67 37         67 37         67 37         67 38         67 37         67 38         67 37         67 38         67 38         67 38         67 38         67 38         67 38         67 38         67 38         67 38         67 38         67 37         67 38 <td< td=""><td>-13</td><td>1</td><td></td><td></td><td>38 4 45</td><td>39 1 43</td><td>39</td><td>2</td><td>39 4</td><td>2</td></td<>	-13	1			38 4 45	39 1 43	39	2	39 4	2
42 34 1 40 34 46 36 0 40 37 69 37 17 40 36 43 36 245 42 46 39 0 42 45 69 38 14 42 42 41 35 5 0 44 65 5 0 44 63 8 0 43 45 69 38 14 42 42 41 35 5 0 44 63 8 0 43 46 89 14 42 42 41 35 5 0 44 63 8 0 43 46 89 14 42 42 41 35 5 0 44 63 8 0 43 46 89 14 42 42 41 35 14 42 42 41 35 14 45 40 44 63 8 0 43 46 89 10 42 40 134 14 5 0 40 34 49 14 5 40 34 14 5 40 14 63 8 0 43 46 49 14 62 40 14 14 5 40 14 14 14 14 14 14 14 14 14 14 14 14 14	-12			70	37 3 45	39	39 28 42	37 6	39	8
42 35 1 40 34  46 37 0 40 37 6 937 12 40 35 42 35 1 45 40 46 38 0 43 45 93 14 2 42  41 35 5 5 0 44 65 80 60 77 6 40 36 60 34 61 34 15 50 60 61 34 61 34 15 0 42 40 61 34 15 0 42 35 61 35 61 35 0 42 42 42 42 42 42 42 41 35 1 50 41 15 15 0 40 35 61 40 35 61 40 35 61 41 31 0 45 38 1 42 35 1 42 35 61 41 35 1 50 41 35 1 50 41 35 1 60 35 1 40 35 1 40 35 1 41 30 0 45 37 1 42 36 1 42 35 1	-11		75 05 0 85 95	9	36 2 45	39 0 45	38 19 42	36 5	39 2	48 38 21 50 44
41 32 1 4.0 33 46 37 0 4.0 36 49 37 5 4.0 33 41 33 0 45 39 6 42 44 49 37 6 42 39 41 33 1 50 41 45 38 0 50 42 4 49 37 6 42 39 41 33 1 50 41 41 35 0 50 39 46 38 0 42 44 49 37 5 40 23 41 33 0 45 39 0 42 34 49 37 5 40 33 41 33 0 45 39 0 42 34 49 37 5 40 33 41 33 0 45 39 0 42 34 49 37 5 40 39 46 38 0 42 34 49 37 5 40 39 46 38 0 42 34 49 37 5 42 37 41 29 0 50 39 46 38 0 51 44 9 37 1 50 40 39 41 28 0 42 34 47 37 0 43 42 34 14 2 34 14	-10	l i		40	35 1 45	38 0 43	38 14 42	35 3	38 0	38 15
41 32 1 40 32         46 37 0 40 36         47 37 0 45 36         46 38 0 42 44         49 37 3 42 38         41 31 1 50 41         48 37 0 42 44         49 37 3 42 38         41 31 2 50 40         46 38 0 43 44         49 37 3 42 38         41 31 2 50 40         46 38 0 43 44         49 37 3 42 38         41 31 2 50 40         46 38 0 43 44         49 37 3 42 38         41 31 2 50 40         46 38 0 50 45         48 37 4 53         48 37 6 43 45         48 37 6 43 45         48 37 6 43 45         48 37 6 43 45         48 37 6 43 45         48 37 6 43 45         48 37 6 42 34         48 37 6 42 35         48 37 6 43 36         48 37 6 42	6-	1		6 40	34 1 45	38 0 43	38 10 42	34 3	8	38 11
41 29 0 40 31 47 37 0 40 35 49 36 0 40 32 41 31 0 45 38 46 38 0 43 44 97 3 42 38 41 31 2 50 40 46 38 0 50 45 48 7 49 7 150 41 24 1 24 1 24 1 24 1 24 1 24 1 24 1	.8	41 32 1 40 32	92 07 0 22 97		33 0 45	38 0 42	37	33 1	38 0	37
41 29 0 40 30 47 37 0 40 35 49 36 2 40 31 41 30 0 45 37 47 37 0 43 42 42 37 41 26 0 50 39 46 38 0 51 44 49 37 1 50 49 41 22 0 40 29 48 34 0 40 34 49 35 0 40 39 41 26 0 45 35 48 37 0 43 41 24 62 34 41 26 1 50 36 47 37 0 50 42 49 35 0 40 39 50 32 1 40 28 40 24 0 45 33 48 37 0 42 40 50 35 1 42 6 1 50 36 47 37 0 50 42 49 35 0 40 39 50 40 32 50 40 27 40 27 40 27 28 48 36 0 42 39 50 32 0 42 31 40 21 0 50 33 47 36 0 50 39 47 37 0 50 39 47 37 0 50 49 39 0 49 39 0 49 38 0 40 38 0 40 38 0 40 26 40 19 0 45 31 49 36 0 42 39 50 42 31 40 2 10 50 33 47 36 0 50 39 49 35 0 49 39 0 49 39 0 40 30 40 18 0 40 25 40 17 0 45 29 49 35 0 42 37 49 40 2 20 40 2 20 40 17 0 50 30 47 35 0 50 38 49 34 0 49 39 0 49 39 0 49 39 0 49 39 0 49 39 0 49 39 0 49 39 0 49 30 40 18 0 40 18 0 40 20 30 40 18 0 40 20 30 40 18 0 40 20 30 47 35 0 50 38 49 34 0 49 39 0 49 39 0 49 39 0 49 39 0 49 39 0 49 39 0 49 39 0 49 39 0 49 39 0 49 30 40 30 30 40 30 30 30 30 30 30 30 30 30 30 30 30 30	.7	1		0 40	31 0 45	38 0 43	37 3 42	31 2	38 0 50	37
41 27 0 40 28 48 34 0 40 34 49 34 0 40 30 41 28 0 45 35 47 37 0 43 42 49 34 14 23 6 41 28 0 50 37 46 37 0 51 43 7 0 51 49 37 0 49 40 28 41 28 0 40 28 41 26 0 45 35 48 37 0 42 40 50 34 41 26 0 42 33 41 26 0 45 35 41 26 0 45 35 48 37 0 42 40 50 34 41 26 0 42 33 41 26 0 42 33 41 26 0 50 35 47 37 0 51 40 49 36 0 49 36 0 49 49 36 0 49 36	9-	1 1	i 1	2 40	30 0 45	37 0 43	37 2 42	29 0 50	38 0 51	37 1
41 25 0 40 28 48 36 0 40 34 49 35 0 40 29 41 26 0 45 33 48 37 0 43 41 69 36 0 42 34 41 26 1 50 36 47 37 0 50 42 49 56 0 49 36 0 40 27 49 36 0 40 33 50 35 1 40 28 40 24 0 45 33 48 34 0 42 40 50 35 0 42 33 41 24 0 50 35 47 37 0 51 40 49 36 0 49 36 0 49 36 0 40 30 49 35 0 40 30 50 35 0 40 25 40 17 0 45 29 49 35 0 42 37 49 40 22 28 40 17 0 50 30 47 35 0 50 36 49 34 0 49 94 94 94 94 94 94 94 94 94 94 94 94	.5			9	28 0 45	37 0 43	36 1 42	28 0 50	37 0 51	37 0
41 23 0 40 27 49 34 0 40 33 50 35 1 40 28 40 24 0 45 33 48 37 0 42 40 50 34 0 42 33 41 24 0 50 35 47 37 0 51 40 49 50 0 49 60 24 40 24 0 40 25 49 35 0 40 31 50 34 0 40 25 40 17 0 45 29 49 35 0 42 37 40 42 28 40 17 0 50 33 47 34 0 50 38 49 34 0 49 94 94 95 0 42 37 40 42 28 40 17 0 50 33 47 34 0 50 38 49 34 0 49 94 94 94 94 94 94 94 94 94 94 94 94	-4			0 40	26 0 45	37 0 43	36 0 42	26 1 50	37 0 50	36 0
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40 16 0 40 25 49 35 0 40 31 50 34 0 40 25 40 17 0 45 29 49 35 0 42 38 60 22 8 40 17 0 45 29 49 35 0 42 37 49 34 0 42 28 40 17 0 50 30 47 35 0 50 36 49 34 0 49	-2			9	21 0 45	36 0 42	35 0 42	21 0	36 0 50	22
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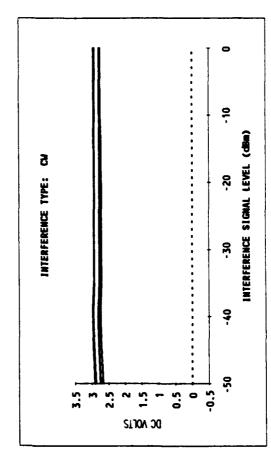
TABLE 3. DESENSITIZATION EFFECT ON MARKER RECEIVERS FROM PULSE MODULATED (PM) INTERFERENCE

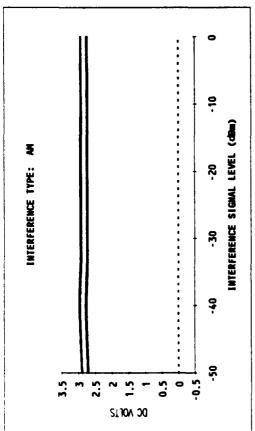
		N/(N+S)			N/(N+S)			N/(N+S)	
		9			<b>(9</b>			( <b>9</b> 5)	
F1/F2	_	(Outer Marker Mode)	-	<b>.</b>	(Middle Marker Mode)	(9	= 	(Inner Marker Mode)	2
Signet	007	400 Hertz PM Interference	ence	1300	1300 Nertz PM Interference	rence	3000	3000 Hertz PM Interference	rence
Level	F1 08	£ 8	F1 OFF	F1 08	F1 04	F1 OFF	F1 08	F1 ON	F1 OFF
( <b>8</b>	F2 ON	F2 OFF	F2 ON	F2 ON	F2 OFF	F2 ON	F2 OF	F2 OFF	F2 OM
	9575775	951519		BECEIVED	BECE I VEB	PECETVER	PECFIVE	BECE IVER	PECEIVER
	12345	_	12345	12345	12345	1 2 3 4 5	12345	12345	12345
Basel inc	55 38 42 38 37	55 38 43 38 38	53 38 38 38 38	54 39 43 43 44	54 39 37 43 46	52 39 38 43 44	53 39 43 51 49	52 39 38 52 49	51 39 38 50 47
07-	52 35 39 37 37	53 37 40 38 37	42 36 34 38 37	49 33 35 38 43	52 35 36 43 44	42 35 33 43 42	77 27 28 18 57	50 32 33 52 44	11 32 32 50 44
-35	48 32 32 34 36	51 34 37 36 36	42 34 31 37 36	45 29 29 35 40	49 31 32 38 43	42 31 30 35 41	07 07 92 92 17	47 28 29 41 40	29 28 28 41 43
-30	44 28 22 33 33	48 31 32 33 34	42 30 25 34 34	40 24 21 34 36	44 27 27 34 40	40 27 24 33 40	36 21 20 39 35	42 23 24 39 36	36 23 22 39 41
.25	39 23 14 32 29	44 26 25 32 31	42 26 16 32 31	36 19 13 32 32	37 22 20 33 37	37 22 15 32 37	30 16 12 37 30	38 18 18 38 32	32 18 15 38 37
-20	35 20 8 31 24	38 21 17 32 26	39 21 6 31 27	30 14 7 31 27	33 17 13 32 32	33 17 8 31 33	21171125	32 13 11 37 27	27 13 8 34 33
-15	29 17 6 31 19	32 18 17 30 22	34 19 3 30 22	25 10 5 5 22	28 12 12 29 28	28 12 2 30 28	19 7 4 1 20	27 9 6 1 23	22 9 3 2 28
-14	28 17 5 31 18	31 18 15 30 21	33 17 3 30 21	25 9 4 0 21	72 0 11 11 72	27 11 2 29 27	18 6 4 1 19	25 8 5 1 22	20 6 3 2 27
-13	28 16 5 31 17	30 17 12 30 20	32 17 2 30 20	25 9 4 0 20	26 10 7 0 26	26 10 2 29 26	17 6 3 1 18	25 7 4 1 21	19 7 2 2 26
-12	26 16 4 31 16	29 17 5 31 19	30 16 2 30 19	54 8 4 0 19	25 10 \$ 0 25	25 9 2 0 25	16 5 3 1 17	24 6 3 1 21	18 6 2 2 25
-11	25 16 4 31 16	28 16 5 31 18	29 16 1 30 18	22 7 4 0 18	72 0 5 6 72	23 9 2 0 24	14 4 3 1 16	23 5 2 1 20	17 5 2 2 24
-10	24 15 4 31 14	71 15 8 31 17	28 15 1 30 17	20 7 3 0 17	23 8 3 0 23	22 8 1 0 23	13 4 3 2 15	22 5 2 1 19	16 5 2 2 23
6-	23 11 4 32 13	26 15 2 31 16	27 15 2'31 16	19 6 4 0 16	21 7 2 0 22	21 7 0 0 22	11 3 3 2 14	21 4 1 1 18	15 4 2 3 22
8-	22 10 3 31 12	25 14 1 31 15	26 14 0 30 15	19 5 3 0 15	20 7 1 0 21	20 7 2 0 20	10 2 2 2 13	19 3 1 1 17	14 3 2 3 21
-7	22 9 4 32 11	24 11 0 32 14	25 10 2 31 14	18 5 3 0 14	19 6 1 0 20	19 6 2 0 20	9 2 2 2 12	18 3 0 1 16	12 3 2 3 20
9-	21 9 4 32 10	23 10 0 32 12	24 10 1 32 13	17 4 3 0 13	18 5 0 0 19	18 5 1 0 18	8 1 3 3 11	18 2 0 2 15	11 2 1 3 19
.5	20 8 4 32 9	21 9 0 33 11	23 9 2 32 12	16 3 3 0 12	17 5 0 0 18	16 5 1 0 17	7 1 2 3 10	17 2 0 2 15	10 2 1 3 18
4-	19 8 4 33 8	20 9 0 33 11	22 8 0 33 11	15 3 3 0 11	16 4 0 31 16	15 4 0 0 16	6 1 2 3 9	15 1 0 3 14	9 1 1 3 17
-3	19 6 4 33 7	19 8 0 33 10	21 8 1 33 10	14 3 2 0 11	15 3 0 31 15	14 3 0 0 15	5 0 2 3 8	14 1 0 3 13	7 1 1 3 15
-2	18 6 4 32 6	19 7 0 33 9	20 7 2 33 10	14 2 3 0 10	14 3 0 0 14	12 2 1 0 14	4 0 2 2 7	11 0 0 4 12	6 1 1 3 14
-	19 6 4 33 6	18 7 0 34 8	19 7 0 33 8	13 2 3 0 9	13 2 0 0 12	11 2 1 0 13	4 0 2 2 7	9 0 0 5 11	5 0 1 3 13
0	19 5 4 33 4	17 7 0 33 7	18 7 1 33 7	13 2 3 0 8	12 2 0 0 11	11 1 1 0 12	4 0 2 1 6	9 0 0 4 11	4 0 1 3 12

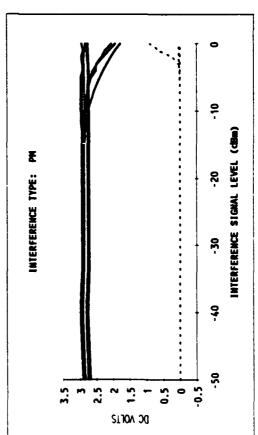
TABLE 4. DESENSITIZATION EFFECT ON MARKER RECEIVERS FROM CONTINUOUS WAVE (CW) INTERFERENCE

		N/(N+S)			N/(N+S)			N/(N+S)	
		( <b>g</b> p)			<b>9</b>			( <b>9</b> 9)	
F1/F2		(Outer Marker Mode)	•	-	(Middle Marker Mode)	•		(Inner Marker Mode)	•
Signet	Conti	Continuous Wave Interference	erence	Conti	Continuous Wave Interference	erence	Conti	Continuous Wave Interference	erence
Level	2	F1 OH	F1 OFF	F1 ON	F1 ON	F1 0FF	HO 14	H0 14	F1 OFF
( <b>B</b>	F2 08	F2 OFF	F2 ON	F2 ON	F2 OFF	F2 ON	F2 ON	F2 OFF	F2 ON
<u> </u>	RECEIVER	RECEIVER	RECEIVER	RECEIVER	RECEIVER	RECEIVER	RECEIVER	RECEIVER	RECEIVER
	12345	12345	1 2 3 4 5	12345	12345	1 2 3 4 5	12345	12345	12345
Basel ine	e 54 38 44 39 37	54 38 43 40 37	24 38 44 40 37	54 39 45 43 45	24 39 43 44 45	54 39 43 44 45	52 39 39 52 48	38 52 4	52 39 38 52 48
07-	55 39 42 39 37	55 38 44 40 37	24 38 44 40 37	55 40 42 43 46	54 39 43 44 45	54 39 43 44 45	53 40 39 52 48	53 39 38 52 48	53 39 38 52 48
÷	55 39 34 39 37	55 38 43 40 37	54 38 44 40 37	55 40 34 43 46	54 39 42 44 45	54 39 43 44 45	53 40 33 52 48	53 39 38 52 48	53 39 39 52 48
Ŗ	55 39 24 39 37	54 38 42 40 37	54 38 44 40 37	54 39 24 43 46	54 39 41 44 45	54 39 43 44 45	53 40 23 52 48	53 39 38 52 48	53 39 39 52 48
5	54 39 16 39 37	54 36 39 40 37	54 38 43 40 37	53 39 16 43 45	54 39 38 44 45	24 39 43 44 45	52 40 16 52 48	53 39 37 52 48	53 39 39 52 48
R	51 39 10 39 37	54 36 35 40 37	54 38 42 40 37	50 39 10 43 45	54 39 33 44 45	54 39 42 44 45	49 39 10 52 48	53 39 33 52 48	52 39 40 52 48
÷	48 38 9 39 36	54 38 28 40 37	54 38 39 40 36	48 39 9 43 45	54 39 27 44 45	54 39 39 44 45	46 39 9 52 47	52 39 27 52 48	52 39 39 52 47
÷	48 38 9 39 36	54 38 27 40 37	54 38 38 40 36	47 38 9 43 44	54 39 26 44 45	24 39 38 44 44	46 38 9 52 47	52 39 26 52 48	52 39 38 52 47
÷	47 37 9 39 35	24 38 26 40 36	54 38 37 40 36	75 75 6 45 45	54 39 24 44 45	54 39 37 44 44	45 38 9 52 47	52 39 24 52 47	52 39 36 52 47
2	47 37 9 39 35	54 38 24 40 37	54 38 35 40 36	46 37 9 44 44	54 39 23 44 45	24 39 36 44 44	45 38 9 52 46	52 39 23 52 47	52 39 35 52 47
=	46 35 10 39 34	54 36 23 40 36	54 37 33 40 35	46 36 10 44 42	54 39 21 44 45	53 38 34 44 43	44 36 10 52 46	52 39 21 52 47	52 38 33 52 46
۶	46 34 10 39 33	54 38 20 40 36	54 37 32 40 34	45 35 10 44 42	24 38 19 44 44	23 38 32 44 43	44 35 10 52 45	52 39 18 52 47	52 38 32 52 46
٠	45 33 10 39 32	54 36 18 40 35	53 37 31 40 34	45 34 10 44 41	53 38 17 44 44	53 38 31 44 42	44 34 10 52 44	52 38 16 52 46	52 38 31 52 45
÷	45 32 10 39 32	54 37 17 40 35	53 37 30 40 33	45 33 10 44 40	53 38 15 44 44	53 38 30 44 42	43 33 10 52 43	52 38 14 52 46	51 38 30 52 45
٠	45 30 10 39 31	54 37 15 40 35	53 37 28 40 32	44 31 10 44 40	53 38 14 44 43	53 37 29 44 41	43 31 10 52 43	52 38 13 52 46	51 37 29 52 44
۰	44 28 10 39 30	53 37 14 40 35	53 36 27 40 32	44 29 10 44 39	53 38 13 44 43	23 37 28 44 40	43 30 10 52 42	51 38 11 52 45	51 37 28 52 43
'n	44 26 10 39 29	53 37 13 40 34	52 36 26 40 31	44 27 10 44 38	53 38 12 44 42	52 37 27 44 40	42 28 10 52 41	51 38 9 52 45	51 37 27 52 42
7	43 24 10 39 28	53 37 12 40 33	52 36 25 40 30	43 25 10 44 38	53 37 11 44 42	52 36 26 44 39	42 26 10 52 40	51 37 7 52 44	20 36 26 52 42
Ÿ	43 22 10 39 28	53 36 11 40 32	52 35 24 40 29	42 23 10 44 37	52 37 10 44 41	52 36 25 44 38	41 24 10 52 40	51 37 5 52 43	50 36 25 52 41
?	42 20 9 39 27	52 36 10 40 32	51 35 23 40 29	41 21 10 44 36	52 37 9 44 41	51 35 23 44 37	40 21 9 52 39	50 37 4 52 43	50 35 24 52 40
-	41 18 9 39 26	52 36 9 40 31	51 34 21 40 28	40 19 9 43 35	52 36 8 44 40	51 35 22 44 37	39 19 9 52 38	50 36 3 52 42	49 35 22 52 40
•	39 15 9 39 25	51 35 9 40 30	50 34 20 40 27	39 16 9 43 34	51 36 8 44 39	50 34 21 44 36	38 17 9 52 37	49 36 2 52 41	49 34 21 52 39

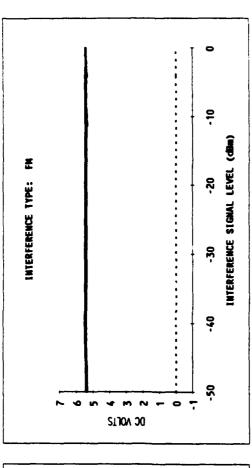


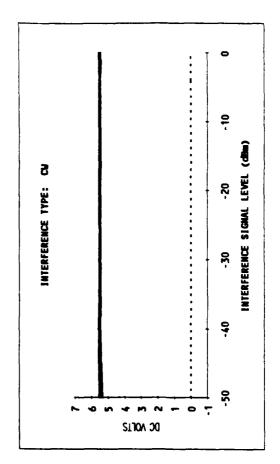


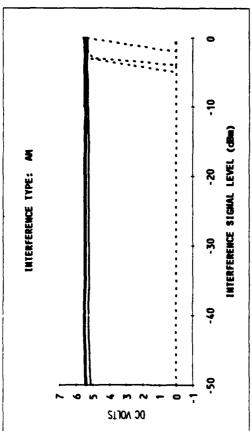


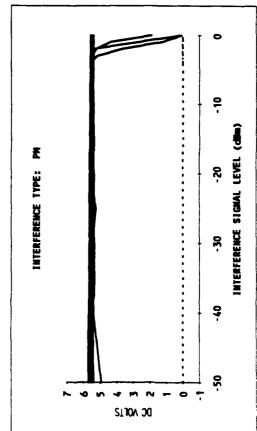


DESENSITIZATION EFFECT ON MARKER RECEIVER NUMBER ONE'S LAMP VOLTAGE FIGURE 3.

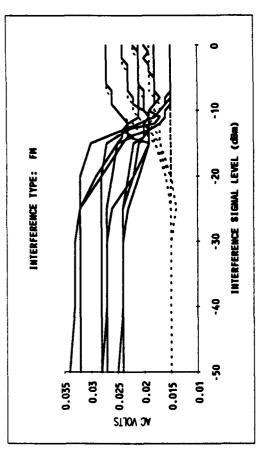


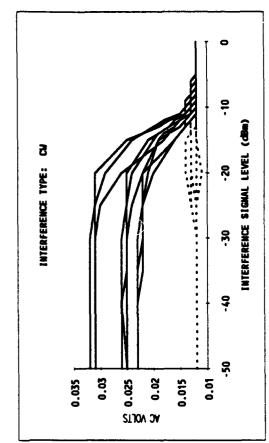


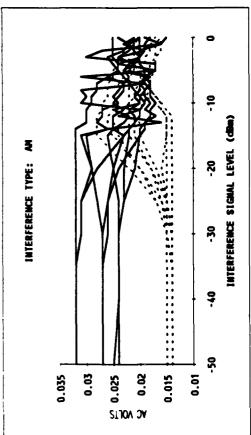


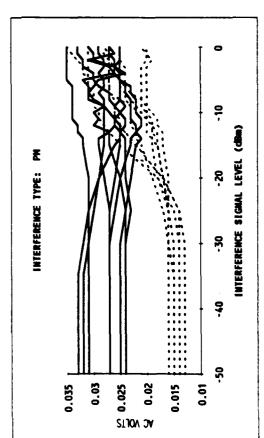


DESENSITIZATION EFFECT ON MARKER RECEIVER NUMBER TWO'S LAMP VOLTAGE FIGURE 4.









DESENSITIZATION EFFECT ON MARKER RECEIVER NUMBER THREE'S LAMP VOLTAGE FIGURE 5.

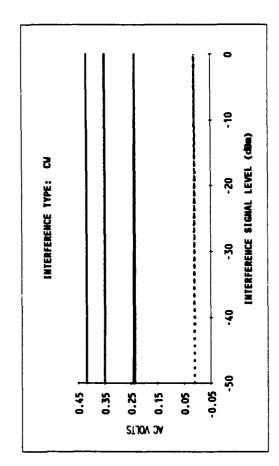
0.45

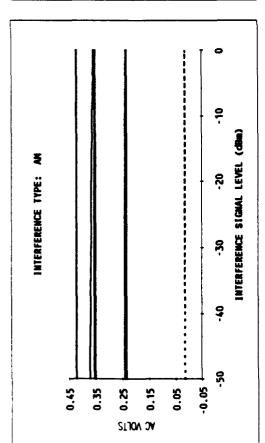
Q.35

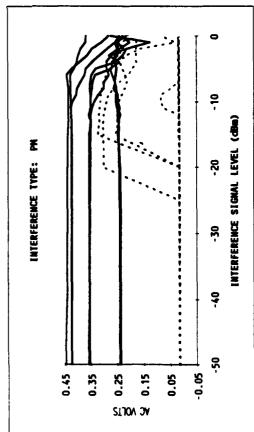
Q.0.05

Q.005

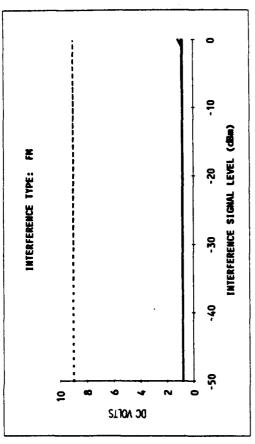
Q.0

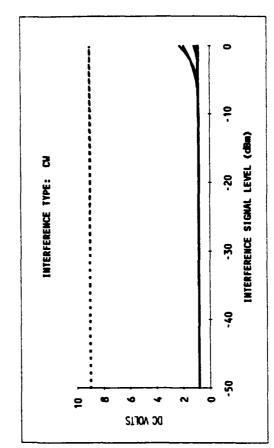


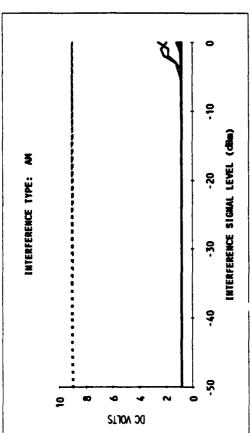


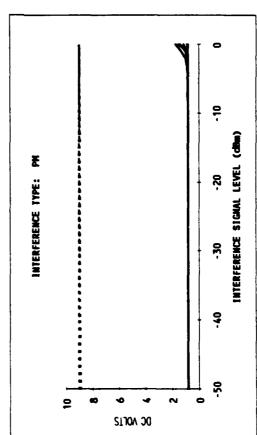


DESENSITIZATION EFFECT ON MARKER RECEIVER NUMBER FOUR'S LAMP VOLTAGE FIGURE 6.









DESENSITIZATION EFFECT ON MARKER RECEIVER NUMBER FIVE'S LAMP VOLTAGE FIGURE 7.

Receivers 1, 4, and 5 did not degrade to a 10-dB (S+N)/N ratio even with interference levels up to 0 dBm; however, receiver 5 (figure 7), in the IM mode, does show a small increase in lamp on voltages beginning at -5 dBm and displays a flashing light at -3 dBm. The interference was not audible on these three receivers.

Note: Using the above space loss equation, it is calculated that a -25 dBm interfering level corresponds to an aircraft passing within 587 feet of the interferer. An aircraft making an instrument approach using a 3° glide slope angle would reach this altitude approximately 1.8 nmi from touchdown.

<u>Frequency Modulation</u>. With FM interference, table 2 shows that only receiver 3 experienced 10-dB or less (S+N)/N ratios. This occurred at interfering levels greater than -20 dBm. At -16 dBm, the (S+N)/N ratio would be 5 dB. The lamp voltages on figure 5 also show the effect begins at -20 dBm with a flashing light noticeable at -15 dBm in all Marker modes. The interference became audible around the 10-dB (S+N)/N point.

Receivers 1, 2, 4, and 5 did not degrade to 10 dB or produce audible interference even with interference levels up to 0 dBm, however receiver 5 exhibited a slight change in lamp on voltage at -2 dBm.

<u>Pulse Modulation</u>. Pulse modulation, as shown on table 3, affected all five receivers. Most susceptible were receivers 3 and 4 which decreased to 10-dB (S+N)/N at approximately -23 dBm, a slight improvement over AM interference. Figures 5 and 6 show the lamp voltages also start changing at this point. Receiver 3 experienced a flashing light condition by -15 dBm in all Marker modes. In the MM mode at -4 dBm with F1 on and F2 off, receiver 4 experienced a sudden increase in (S+N)/N from 0 to 31 dB and back to 0 dB by -2 dBm. This was due to a sudden decrease in the Noise level caused by an unknown receiver mechanism (possibly an AGC response to frequency F1, the PM PRF, and signal level combination).

Next, to degrade to a 10-dB (S+N)/N ratio, was receiver 2 at -17 dBm, although the lamp voltages (figure 4) remained unaffected until -2 dBm. Least susceptible were receivers 1 and 5 at -8 and -6 dBm, respectively with only minimal change in lamp voltages.

At -16 dBm, receivers 2, 3, and 4 had (S+N)/N ratios of 8, 5, and 7 dB, respectively.

With PM, the interference often became audible at signal levels below that required to produce a 10-dB (S+N)/N ratio.

Continuous Wave. With CW interference, table 4 indicates that only receiver 3 degraded to a 10-dB (S+N)/N ratio. This occurred at a -20 dBm interfering level which is also the point at which figure 5 shows the lamp on voltage decreasing. There was little change in (S+N)/N between this point and -16 dBm but lamp on voltages continued to decrease causing the lamp to turn off.

Receivers 1, 2, 4, and 5 did not reach 10 dB even with CW interference levels up to 0 dBm and receiver 5's lamp voltage was only minimally affected. No audible interference was observed on any receiver with CW interference.

### 10-DESIRED SIGNAL.

The no-desired signal test recorded the interfering signal levels at which the interfering tone becomes audible and the lamp(s) turns on. Due to the lamp filter circuits in the receivers, the tone becomes audible at signal levels below that required to turn on the lamp. This information is presented in tables 5 through 7. In these tables, the letter T indicates the interfering tone is audible. The letter B indicates that both the interfering tone is audible and the lamp corresponding to the interfering tone frequency is on.

The letter U indicates the interfering tone is audible and an unselected lamp is lit. (An unselected lamp is when the receiver is being tested with interference using the OM tone, for example, and the MM lamp turns on.) The letter M means the interfering tone is audible and multiple lamps are lit.

Amplitude Modulation. With AM interference, table 5 shows that with no-desired signal present, receivers 3 and 5 produce an audible tone at interfering signal levels below -16 dBm. Receiver 3 also experienced lamp on conditions with interfering levels as low as -13 dBm. For example, in the MM mode with F1 on and F2 off, receiver 3 produced an audible tone at -25 dBm and turned on the MM lamp at -13 dBm.

Receiver 2 produced a tone by -15 dBm. Receiver 1 was minimally affected and receiver 4 was not affected by this type interference. Receivers 1, 2, 4, and 5 did not produce any lamp on conditions with signals up to 0 dBm.

<u>Frequency Modulation</u>. Table 6 shows the effect no-desired signal, FM interference has on the receivers. Receiver 3 produces an audible tone at interfering levels as low as -35 dBm and lamp on indications at -15 dBm. Receiver 3 experienced this level of interference for several test conditions.

Receiver 5 produced an audible output at -11 dBm but did not turn on the lamp with levels up to 0 dBm. Receivers 1, 2, and 4 produced no audible tone or lamp on condition.

<u>Pulse Modulation</u>. No-desired signal, PM interference as shown on table 7 affected all five receivers with receivers 2 and 3 most affected. With 400 Hz interference and F1 and F2 on, receiver 2 produced a tone at -35 dBm. At -14 dBm an unselected lamp turned on also. By -9 dBm, the tone was on and multiple lamps were lit. Only receiver 2 produced this multiple lamp condition. Receiver 3 produced audible tone at -35 dBm and both tone and lamp on by -15 dBm.

Receiver 1 produced tone by -25 dBm and unselected lamp on by -10 dBm. Receiver 4 and 5 produced tone by -8 and -20 dBm, respectively but did not turn on the lamp.

<u>Continuous Wave</u>. The no-desired signal tests were not performed with CW type interference because the desensitization tests had shown that CW does not cause a tone and it turns the lamp off but not on. Therefore, without a desired signal, there were no parameters to observe.

Note: Using the space loss equation, it is found that the above -35 dBm interfering level occurs at a distance of 1856 feet from a 1-W transmitter. An aircraft on a 3° glide slope angle would reach this altitude 5.8 nmi from touchdown which is in the vicinity of the OM.

EFFECT ON MARKER RECEIVERS FROM AMPLITUDE MODULATED (AM) INTERFERENCE WITH NO-DESIRED SIGNAL TABLE 5.

		INTERFERENCE			INTERFERENCE			INTERFERENCE	
		POINT			POINT			POINT	
F1/F2	<u>ت</u>	(Outer Marker Mode)	ê	*	(Middle Marker Mode)	<b>Q</b>		(Inner Marker Mode)	•
Signal	007	400 Hertz AM Interferen	Prence	1300	1300 Hertz AM Interference	rence	0001	3000 Wertz AM Interference	(a)
Level	73 Se	F1 ON	F1 OFF	F1 ON	F1 G4	F1 OFF	F. 09	£ 8	F1 OFF
(dBa)	F2 ON	f2 OFF	F2 ON	F2 OF	F2 OFF	F2 ON	F2 0W	-	
	RECEIVER	RECEIVER	RECEIVER	RECEIVER	KECEIVER	RECEIVER	RECEIVER	RECEIVER	RECEIVER
	12345	12345	12345	12345	12345	12345	_	1 2 3 4 5	1 2 3 4 5
-40									
-35									
-30	1	ı					-	-	
-25	1	1		-	1				_
-20	<b>L</b>	1		-	1	-	1	-	1
-15	-	_	1	-	1	1	1 1	1	1
-14	-	1	1	1 1	1	1	1 1 1	-	
:13	L	8	Ţ	1 1	8	1	1 1 1		
21:	-	89	1	1 1 1	7 8 T	1 1	1 1 1	1 1 1	1 1
÷	-	89	┕	T T T	T 8 T	1 1 1	1 1 1	1 1 1	1 1
ę	-	60	<b>-</b>	1 1 1	1 8 1	TTT	1 1 1	1 1	1 1
٩	-	65	1	1 1 1	T 8 T	TTT	TTT	1 1 1	1 1
*	-	9 1	-	1 1 1	T 89 T	TTT	1 1 1	1 1	1 1 1
-	-	. 1	1	1 1 1	1 8 1	TTT	TTT	T T T	1 1 1
ę	1	89	1 1,	1 1	T 8 T	1 1 1	1 1 1	1 1 1	1 1 1
×.		1 8	1 1	1 1 1	T 8 T	TTT	1 1 1	1 1 1	1 1 1
*	1 1	<b>GB</b>	1 1 1	1 1	T 8 T	T T T	1 1 1	1 1 1	1 1 1
7	1 1	- B	1 1 1	1 1	7 8 7	T T T	1 1 8	1 1 1	1 1 1
~		1 89 1	1 1	1 1	T 8 T	TTT	1 1 E	1 1 1	1 1 1
-	1 1	1 8 1	1 1	1 1	T 8 T	TTT	TBT	1 1 1	1 1 1
	1 1	T 8 T	1 1	1 1 1	T 8 T	T T T	T B T	1 1	1 1

I indicates that the interference (tone) is audible.

A indicates that the lamp lites and the tone is audible.

EFFECT ON MARKER RECEIVERS FROM FREQUENCY MODULATED (FM) INTO-PERENCE WITH NO-DESIRED SIGNAL TABLE 6.

		INTERFERENCE			INTERFERENCE			INTERFERENCE	
		POINT	_	_	POINT			POINT	
F1/F2	9	(Outer Marker Mode)	9	* -	(Middle Marker Mode)	( <del>)</del>	<u> </u>	(Inner Marker Mode)	(9
Signal	H 007	400 Hertz FM Interference	rence	1300	1300 Hertz FM Interference	rence	3000	3000 Nertz FM Interference	rence
Level	20	F1 ON	F1 OFF	F1 08	F1 ON	F1 OFF	F1 ON	F1 08	F1 OFF
(GB)	F2 ON	F2 OFF	F2 ON	F2 GE	F2 OFF	£5 25.	F2 OH	F2 OFF	F2 ON
	RECEIVER	RECEIVER	RECEIVER	RECEIVER	RECEIVER	RECEIVER	RECEIVER	RECEIVER	RECEIVER
97	1 2 3 4 5	12345	12345	12345	12345	12345	12345	12345	12345
ä		1		1=			Þ	-	
-30	ı	1					-		
٠2	1	1		1	-		-	,	
Ŗ	-	T		1	-	_	1	_	1
-15	1	æ	7	<b>CO</b>	43	1	~	9	1
¥	-	65	1	•	6	-	_	69	-
E.	1	89	T	8	ك	1	<u>.</u>	•	-
2	-	8	Ţ	88	8	L	1	6	1
=	-	69	Ţ	8	8	1	1	æ	
흔	80	60	1	œ	•	1	1 1	65	1
<u>ج</u> ا	8	-	1	8	9	1	1 8	8	1
<b>.</b>	•		1	8	8	1	69	80	1 1
-	•	6	L	68	8	1	8	•	1 1
ş	<b>G</b>	62	, 1	8	8	•	1 8	æ	1 1
<u>ئ</u>	•	88	-	•	89	1	1 8	- 89	1 1
4	•	8	-	8	CS)	1	1 8	T 8	1
<u>ښ</u>	œ	8	-	<b>6</b>	<b>(5)</b>	1	1 8	<b>CS</b>	1 1
$\stackrel{\sim}{\sim}$	6		-	æ	60	1	B T	1 8	1 1
-		8	-	60	<b>65</b>	T T	8	1 8	1 1
	<b>G</b>	89	1	80	æ	1 1	1 8 T	1 89 T	I I

I indicates that the interference (tone) is audible. B indicates that the lamp lites and the tone is audible.

TABLE 7. EFFECT ON MARKER RECEIVERS FROM PULSE MODULATED (PM) INTERFERENCE WITH NO-DESIRED SIGNAL

Fi ON   Fi O			INTERFERENCE			INTERFERENCE			INTERFERENCE	
400 Hertz PM Interference         1300 Hertz PM Interference         1300 Hertz PM Interference           F1 OM         F2 OM		-	POINT			POINT			POINT	
Fi OM   Fi O	F1/F2	<u>~</u>	Outer Marker Mod	•	3	iddle Marker Mod	•	<b>=</b>	(Inner Marker Mode)	G
F2 ON   F2 OF   F2 ON   F2 ON   F2 ON   F2 OF   F2 ON   F2 ON   F2 OF   F2 ON   F2 O	Signal	007	Hertz PM Interfe	rence	1300	Hertz PM Interfe	rence	3000	3000 Hertz PM Interference	rence
F2 ON   F2 OFF   F2 ON   F2 ON   F2 OFF   F2 ON	Level							F1 0W	F1 ON	F1 OFF
1 2 3 4 5 1 2	<b>(49</b> )							F2 ON	F2 OFF	F2 ON
1 2 3 4 5 1 2		RECEIVER	RECEIVER	RECEIVER	RECEIVER	RECEIVER	RECEIVER .	RECEIVER	RECEIVER	RECEIVER
		3 4	1234	2 3 4	1234	2 3 4	2 3 4		12345	1 2 3 4 5
	07-									
	-35	1	1	1	l	1		1 1	1	
	S.	1	1 1	T T			i	1 1	1 1	1 1
1   1   1   1   1   1   1   1   1   1	Š	- 1	T T T	T T	1		1 1	1 1 1	1 1	1
T   T   T   T   T   T   T   T   T   T	-20	1	۰	1	7 7	T T	1 1	ا ا	1 1 1	1 1 1 1
TUT 1 TIE TITE TITE TITE TO TO TO TO TENT TITE TENT TITE TITE TITE TITE TITE	-15	-	-	1 1	n T		1	1 111	1 111	1 1 1 1
T   U   T   T   T   G   T   T   T   T   T   T	-14	7	8	1 1	חנ	1 0	ר ט		1 111	1 1 1 1
T   U   T   T   U   S   T   T   U   T   T   T   U   T   T   T	:	- n	8	1	1	T U	1 O		1 111	1 1 1 1
1   1   1   1   1   1   1   1   1   1	-12	- 5	٦	- 7	-	T 0	U T	TBT	1 111	TTTT
1	F	- 3	٦	L J	1 0	<b>8</b>	T 0		1 8 1 1	1 1 1 1
	ė	9	8	ı	1	2	J 1	1	1 8 1 1	1 1 1 1
	Ģ	=	8 0	- n	T 0	8	T U		1 8 1 1	T T T T
	9,	=	<b>3</b>	-	T 0	8	1	TBTT	TBT	TTTT
	'	=	<b>8</b> D	- 1	T 1	<b>8</b>	_ n		1 8 1 1	1 1 1 1
	9	=	<b>8</b>	¥	T 0	8	T U	1811	1 1 8 1 1	TTTT
	ż	-	2	-	I H	8	U T		1 1 8 1 1	TTTT
	7	20	Ξ	=	H	<b>8</b>	U T	1	1 1 8 1 1	1 1 1 1 1
TRESTINGS TINT TRITIONS TOUR TOUR TREET	.3	-	×	-	<b>H</b>	80	1 0		1 1 8 1 1	1 1 1 1 1
THE STATE OF THE S	?	•	=	-	<b>-</b>	8	>		1 1 8 1 1	TITIT
	-	- 1		_	=	<b>8</b>	1 0		TTBTT	TTTT
	0	T M B T	T # 8 T	THI	THT	1 8 N N	U U T T	TBTT	1 1 8 1 1	TITI

I indicates that the interference (tone) is audible. B indicates that the lamp lites and the tone is audible.

U indicates that the tone is audible and an unselected lamp is lit. M indicates that the tone is audible and multiple lamps are lit.

# SELECTIVITY MEASUREMENT

Table 8 charts the selectivity of the five receivers in the MM mode at the 6-, 40-, and 60-dB points. The Total Bandwidth of the receiver is given for each of the above points as well as the frequency spread above and below the center (75 MHz) frequency.

Receivers 1, 2, and 4 did not exceed the new +/- 200 kHz guard band even at the 60-dB point. For example, at the 60-dB point, the receiver 4 band extended 79 kHz below center frequency and 78 kHz above for a total band of 157 kHz. Receivers 3 and 5 have 60-dB bandwidths that exceeds the new guard band and receiver 3 also exceeds -200 kHz at 40 dB. This may explain receivers 3 and 5's greater susceptibility to no-desired signal AM and FM interference but it does not entirely explain Marker receiver susceptibility to interference as evidenced by receivers 1 and 2's response to PM.

# MARKER RECEIVER EQUIPMENT

Five general aviation Marker Receivers were used for this project. They are listed below in random order which does not necessarily correspond to receivers 1 through 5 referenced throughout the report.

- A. NARCO CP-136
- B. ARC R-402A
- C. KING KR-21
- D. COLLINS MKR-350
- E. TERRA TM-23

TABLE 8. MARKER RECEIVER SELECTIVITY IN MIDDLE MARKER MODE

UPPER BAND + 195 + 424 + 31 ÷ 72 + 78 60 de BANDWIDTH LOWER BAND (KHZ) - 340 - 235 - 31 - 59 ٤. TOTAL BAND 131 430 157 \$ 3 UPPER BAND + 182 = + 41 + 52 + 93 40 dB BANDWIDTH LOUER BAND - 220 (kHz) . 5 - 38 . 53 - 76 TOTAL BAND 405 Ŝ 169 2 2 UPPER BAND + 15.5 + 7.5 + 19 + 19 6 dB BANDWIDTH LOLER BAND - 7.5 (kHz) - 20 92 . - 16 TOTAL BAND 13.5 31.5 13.5 33 8 RECEIVER HUMBER

### CONCLUSIONS

- 1. Equipment that generates Auditory Assistance Device signal levels (0.0012 watts (W) maximum) did not cause desensitization or no-desired signal type interference to the five Marker Receivers tested.
- 2. Equipment that generates Federal Communications Commission (FCC) Part 90 signal levels (1 W maximum) in these new bands can degrade Marker Receiver performance.
- 3. One of the five Marker Receivers tested, experienced significant ((S+N)/N ratio of 10 dB or less) desensitization when exposed to amplitude modulation, frequency modulation, pulse modulation, or continuous wave type interference at levels below what a Part 90 device is expected to produce on the instrument landing system approach path. Two other Marker Receivers also experienced significant desensitization due to pulse modulation at levels below the Part 90 limit.
- 4. With amplitude modulation, frequency modulation, and continuous wave type interference, the other four Marker Receivers did not experience significant desensitization until the interfering levels greatly exceeded that expected along the aircraft's approach path from a Part 90 device.
- 5. With no-desired signal present, amplitude modulation, frequency modulation, and pulse modulation at Part 90 device signal levels can cause a false Marker to appear. Audible and visual indications were observed on the Marker Receivers.
- 6. Two of these five Marker receivers had 60-dB bandwidths that exceeded the new guard band. One of these two also had a 40-dB bandwidth that exceeded the new guard band.

### RECOMMENDATIONS

To reduce the affect on Marker Receivers from users of these new frequencies, it is recommended that the following requirements be incorporated into the FCC Notice of Proposed Rule Making, PR Docket No. 91-295 for Part 90 devices:

- 1. Transmit antennas for this new equipment shall be located at least 2000 feet from any instrument approach path.
- 2. Users of these new frequencies shall utilize vertically polarized antenna systems. This will provide maximum cross polarization isolation from the horizontally polarized Marker antennas.
- 3. Frequency Modulated (FM) or Continuous Wave (CW) type transmissions shall be utilized whenever possible. FM and CW had the least effect on the Marker Receivers tested.
- 4. Pulse Modulation (PM) shall be avoided whenever possible. PM affected all the Marker receivers tested.
- 5. The equipment shall transmit the minimum power required to perform its function and shall not exceed 1 watt (W).

APPENDIX A

DESENSITIZATION EFFECT ON MARKER RECEIVER NUMBER ONE'S LAMP VOLTAGE (INTERFERENCE: F1 AND F2)

				A	LAMP VOLTAGE	İ						LAMP VOLTAGE	LTAGE							LAWP VOLTAGE	LTAGE			
				3	(ADC)			-				(VOC)	3							(Sec.)	ទ			
F1/F2			€	iter Ma	(Outer Marker Mode)	ş					(Mick	(Middle Marker Mode)	ker Ma	ş		-				r Mark	(Inner Marker Mode)	3		
Signal	_		<b>2</b> 00 <b>4</b>	ertz 1	400 Hertz Interference	- Guce					1300 He	1300 Hertz Interference	terfer	auce auce				M	900 He	rtz In	3000 Hertz Interference	ace		
Level				F	F1 AND F2 ON							F1 AND F2	F2 ON							F1 AND	F2 ON			
	ŧ	*	Œ	-	£		3	_	*		Œ		₹		3		₹		F		₹		3	
	٤	off	۶	off	8	off	8	off	8	off	ક	off	5	off	8	off	8	off	٤	off	8	off	8	off
Basel ine	2.70	ğ	2.57	80	2.67	.000	2.65	.000	2.89	.000	2.86	.000	2.85	.000	2.90	000	2.90	8	2.90	8	2.90	8	2.88	8
-40	2.76	8	2.67	90.	2.74	000	2.73	.000	2.95	.000	2.92	.000	2.91	.000	2.97	8	2.98	8	2.98	8	2.93	8	2.8	8
.35	2.72	8	2.63	8	2.70	000.	2.71	000	2.91	000.	2.88	.000	2.87	.000	2.93	900	2.95	00	2.94	8	2.90	900	2.92	8
Ŗ	2.71	8.	2.63	900	2.70	000.	2.71	.000	2.91	000	2.88	.000	2.86	.000	2.92	8	2.94	8	2.93	8	2.90	8	2.92	8
-25	2.71	8 8	2.64	000	2.70	900.	2.71	.000	2.91	000.	2.88	.000	2.86	.000	2.92	80	2.%	8	2.93	86	2.90	2 000.	2.92	8
02	2.71	ŝ	79.2	00	2.71	900	2.71	.000	2.91	000.	2.88	.000	2.87	.000	2.92	8	2.9%	8	2.93	80.	2.89	000	2.92	8
:15	2.2	8	2.64	8	2.71	000	2.72	.000	2.91	000.	2.88	2 000	2.87	2 000	2.92	000	2.94	000	2.93	8	2.85	.000	2.92	900
-14	2.72	8 8	2.65	1	2.71	000.	2.72	.000	2.91	000	2.88	.000	2.87	.000	2.92	000	2.94	00:	2.93	8	2.84	2 000.	2.92	8
-13	2.72	ğ	2.65	9	2.71	900	2.72	.000	2.91	000.	2.88	.000	2.87	.000	2.92	000	2.94	000	2.93	900	2.83	2 000.	2.92	000
-15	2.72	Š	2.65	8	2.71	000	2.73	900	2.91	900	2.88	2 000	2.87	.000	2.92	000	2.94	.000	2.93	8	2.81	900	2.92	8
÷	2.72	ş	2.65	8 8	2.71	000	2.73	900	2.91	000.	2.88	.000	2.86	.000	2.92	98.	2.93	8	2.92	8	2.78	8	2.92	8
÷	2.72	Š	2.65	8	2.71	8	2.73	000	2.91	.000	2.88	.000	2.86	.000	2.92	000.	2.93	000	2.95	.000	2.74	.000	2.95	.000
۴	2.72	§.	3.68	ğ	2.71	8	2.73	000.	2.91	000.	2.88	.000	2.65	.000	2.93	900.	2.93	900.	2.95	2 000	2.69	2 000	2.92	900.
90	2.72	8	2.68	8	2.72	8	2.74	.000	2.91	900.	2.88	.000	2.86	.000	2.93	.000	2.93	.000	2.95	2 000	2.62	2 000	2.92	900
	2.72	8	2.68	8	2.72	8	2.74	000.	2.91	000	2.88	.000	2.86	.000	2.93	000	2.93	2 000.	2.92	2000.	2.56	2 000.	2.92	98
۹	2.72	8	3.68	g	2.72	8	2.74	000	2.91	000.	2.88	.000	2.86	.000	2.93	.000	2.93	.000	2.95	2 000	2.47	2007	2.92	900
÷	2.72	ş	2.67	ē	2.73	8	2.74	900	2.91	000	2.88	2 000	2.87	.000	2.93	000	2.93	.000	2.91	2 000.	2.39	2 900.	2.92	900
*	2.72	ŝ	2.67	ē.	2.74	8	2.74	8 8	2.91	8	2.88	2 000	2.87	.000	2.93	.000	2.93	2 000	2.91	000	2.29	.013 2	2.92	000
~	2.72	홍	2.67	ē	2.74	g	2.74	8	2.91	8	2.88	2 000	2.88	.000	2.93	.000	2.92	.000	2.91	.00c	2.18	. 020	2.92	900
?	2.72	8	2.67	ē.	2.75	8	2.74	8	2.91	ğ	2.88	2 000	2.88	.000	2.93	.000	2.92	.000	2.91	.000	2.05	.027	2.92	900
-	2.72	8 8	2.67	8	2.74	8	2.73	8	2.91	000	2.88	.000	2.84	.000	2.93	.000	2.92	2 000.	2.91	.000	1.93	2 920.	2.95	900
°	2.72	8	2.67	6	2.76	8	2.73	900	2.91	000	2.88	.000	2.82	.000	2.93	.000	2.92	.000	2.90	1 000	1.77	. 028	2.91	900

DESENSITIZATION EFFECT ON MARKER RECEIVER NUMBER ONE'S LAMP VOLTAGE (INTERFERENCE: F1 ONLY)

				3	LAMP VOLTAGE							LAMP VOLTAGE	X TAGE						د	LAMP VOLTAGE	LTAGE			
				Š	( <b>V</b> QC)							(VOC.)	Ç							(VBC)	<b>3</b>			
F1/F2			3	ter Ma	(Outer Marker Mode)	Ode Ode					(Nid	II.e Mar	(Middle Narker Mode)	ê ê						r Mark	(Inner Marker Mode)	<b>~</b>		
Signel			<b>804</b>	ertz E	400 Hertz Interference	rence				_	1300 He	irtz In	1300 Hertz Interference	ence				~7	3000 ¥€	rtz In	3000 Hertz Interference	#JCe		-
Level			•	1 OH A	F1 ON AND F2 OFF	OFF					E	ON AN	F1 ON AND F2 OFF	FF						F1 ON AND	D F2 OFF	اي		
	¥	-	FR	_	X.	-	75	,	W		2		₹		3		₹		Œ		₹		3	
	۶	off	8	off	ક	off	۶	off	ક	off	8	off	۶	off	ક	off	ક	off	۶	off	8	ş	٤	off
Basel ine	2.71	8	5.69	8	2.69	8	2.74	8.	2.90	§.	2.85	8	2.89	000.	2.91	000	2.91	000	2.89	.000	2.85	.000	2.91	8
9	2.78	ş	2.76	g	2.74	8	2.81	8	2.97	99.	2.98	000	2.93	000-	2.98	000	2.98	900	2.96	000	2.92	2 000	2.97	8
×	2.74	8	2.2	8	2.71	ş	2.76	ş	2.92	8	2.91	000	2.90	900	2.93	000	2.95	000	2.65	000	2.89	2 000	2.94	8
Ŗ	2.74	8	2.71	ğ	2.71	8	2.76	8	2.92	000	2.91	000.	2.90	000	2.93	900	2.94	000	2.92	000	2.89	90.	2.93	8
×	2.74	8	2.71	8.	2.71	-	2.76	8	2.92	8	2.91	000	2.89	000	2.93	000	2.94	000	2.92	000	2.89	.000	2.93	8
۶	2.73	8	2.71	ē.	2.71	99.	2.76	900.	2.91	000	2.91	000.	2.90	900.	2.93	000	2.94	000	2.92	99.	2.89	90.	2.93	8
-15	2.74	900.	2.71	100.	2.71	000.	2.76	000	16.2	000	2.91	000	2.90	000	2.93	.000	2.94	900	2.91	000	2.88	900	2.93	Š
2	2.73	8	2.71	8	2.71	8	2.76	8	2.91	8	2.91	990	2.90	900.	2.93	000	2.94	000	2.91	000	2.87	2 000.	2.93	8
-13	2.74	8	2.72	8	2.71	8	2.76	900.	2.91	000.	2.91	000	2.91	000	2.93	000	2.94	000	2.91	000	2.87	900	2.93	8
-12	2.74	8	2.72	8	2.72	8	2.76	000	16.5	000	2.91	000	2.91	000	2.93	000.	2.94	000	2.91	8	2.86	8	2.93	8
-11	2.74	000	2.72	.001	2.72	000.	2.77	.000	16.5	900.	2.91	000	2.92	000	2.93	000	2.94	8	2.91	8	2.85	8	2.93	8
-10	2.74	86.	2.71	§.	2.72	80.	2.71	000	1672	000	2.91	000.	2.62	000	2.93	000.	2.93	000	2.91	000	2.84	8	2.93	8
-9	2.74	000.	2.71	.001	2.72	.000	2.76	.000	2.91	000	2.91	000	2.92	000	2.92	8	2.93	8	2.91	8	2.62	8	2.93	8
8	2.74	000	2.72	100.	2.72	900	2.77	.000	2.91	000	2.91	000	2.92	900	2.92	900	2.93	8	2.91	8	2.80	8	2.93	8
	2.74	000	2.72	.001	2.72	000	2.77	.000	2.91	000	2.90	000	2.92	000	2.92	8	2.93	ğ	2.91	8	2.77	8	2.93	8
9-	2.74	000	2.72	100.	2.71	.000	2.76	.000	2.91	000	2.90	000.	2.91	000.	2.92	000.	2.93	8	2.91	8	2.73	8	2.93	ğ
-5	2.74	8	2.72	100.	2.71	900	2.71	.000	16.5	000.	2.90	000	2.90	000	2.92	000	2.93	8	2.91	8	2.68	8	2.93	g
7-	2.74	900.	2.71	.001	2.72	.000	2.77	000.	2.91	000.	2.90	000	2.89	000	2.92	.000	2.93	000	2.91	8	2.60	80	2.93	8
-3	2.74	000	2.72	.001	2.72	.000	2.76	.000	2.91	000.	2.90	000	2.89	000	2.92	000	2.93	8	2.91	8	2.47	8	2.93	8
-5	2.74	000.	2.72	.001	2.73	000	2.76	.000	16.5	000	2.90	000	2.87	000	2.92	00	2.93	§.	2.91	8	2.29	8	2.93	g
-1	2.74	000.	2.72	.001	2.74	.000	2.77	.000	2.91	.000	2.90	000.	2.86	000	2.92	000	2.93	80	2.91	8	2.11	8	2.93	8
Г	2.74	<b>8</b> 0.	2.72	.001	2.76	000	2.77	000.	16.5	000	2.90	000	2.83	000	2.95	000	2.93	000	2.91	000	1.92	900	2.93	8
																							:	

DESENSITIZATION EFFECT ON MARKER RECEIVER NUMBER ONE'S LAMP VOLTAGE (INTERFERENCE: F2 ONLY)

Contact Native Node    Contact Native Nati	•			LAMP	LAWP VOLTAGE		<u> </u>  -				3	LAMP VOLTAGE	LIAGE							LAWP VOLTAGE	X TAGE			
Natical National Na				٦	() ()							Š	ជ							S	Ç			
Fi OFF AND F2 ON			9	uter R	arker M	(ope					CHidd	le Mari	ker Mox	ş						ir Mark	er Mode	•		
FI OFF AND F2 ON         AND F2 ON         AND F2 ON         FI OFF AND F2 ON         AND F2 ON<			9	Hertz	Interfe	rence				_	300 Hei	rtz Ini	terfer	a)Ce				r=1	3000 He	irtz Ir	iterfer	auce		
FM         CM         AM         FM         FM         CM         AM         FM         CM         AM         FM         CM         AM         FM         CM         CM<		- (		19	AND F2	8					Ξ	OFF AN	10 F2 C	灵					Ŧ	OFF	AND F2 (	₹		
an off           2.70         .001         2.76         .000         2.89         .000         2.97         .000         2.97         .000         2.97         .000         2.97         .000         2.97         .000         2.97         .000         2.97         .000         2.97         .000         2.97         .000         2.97         .000         2.97         .000         2.99         .0	₹			Œ	<u>«</u>	<b>=</b>	<u> </u>	3	₹		Œ	_	₹	-	3		₹		F		₹		3	_
2.70         0.01         2.76         .000         2.89         .000 <th< th=""><th>- 1</th><th>ŧ</th><th>۶</th><th>off</th><th>ક</th><th>off</th><th>ક</th><th>off</th><th>ક</th><th>off</th><th></th><th>off</th><th>i</th><th>off</th><th></th><th>off</th><th></th><th>off</th><th>8</th><th>off</th><th>8</th><th>off</th><th>۶</th><th>off</th></th<>	- 1	ŧ	۶	off	ક	off	ક	off	ક	off		off	i	off		off		off	8	off	8	off	۶	off
2.77         .001         2.81         .000         2.86         .000         2.95         .000         2.97         .000         2.94         .000         2.94         .000         2.94         .000         2.94         .000         2.94         .000         2.97         .000         2.94         .000         2.94         .000         2.94         .000         2.94         .000         2.94         .000         2.94         .000         2.94         .000         2.94         .000         2.94         .000 <th< th=""><th></th><th>8</th><th><math>\rightarrow</math></th><th></th><th>2.76</th><th>900.</th><th>2.73</th><th>90.</th><th></th><th></th><th></th><th>_</th><th>1 1</th><th>_</th><th>1 1</th><th>_</th><th>1 1</th><th>-</th><th>l</th><th>-</th><th>2.83</th><th>000</th><th>2.91</th><th>.000</th></th<>		8	$\rightarrow$		2.76	900.	2.73	90.				_	1 1	_	1 1	_	1 1	-	l	-	2.83	000	2.91	.000
2.72         001         2.74         000         2.92         000         2.92         000         2.93         000         2.94         000         2.	اہ	8	_		2.81	80.	2.62	8		_		_		$\overline{}$		$\overline{}$		$\overline{}$		_	2.90	000	2.98	.000
2.72         .001         2.76         .000         2.77         .000         2.91         .000         2.91         .000         2.91         .000         2.94         .000         2.92         .000         2.94         .000         2.94         .000         2.92         .000         2.94         .000         2.94         .000         2.94         .000         2.94         .000         2.94         .000         2.94         .000         2.92         .000         2.94         .001 <th< td=""><td></td><td>8</td><td></td><td></td><td>2.77</td><td>900</td><td>2.77</td><td>.000</td><td></td><td>_</td><td>l</td><td></td><td>1</td><td>_</td><td>1</td><td>_</td><td></td><td></td><td></td><td>_</td><td>2.87</td><td>8</td><td>2.94</td><td>90.</td></th<>		8			2.77	900	2.77	.000		_	l		1	_	1	_				_	2.87	8	2.94	90.
2.72         001         2.76         000         2.91         000         2.94         000         2.94         000         2.94         000         2.94         000         2.92         000         2.94         000         2.94         000         2.94         000         2.94         000         2.94         000         2.94         000         2.94         000         2.94         000         2.94         000         2.94         000         2.94         000         2.94         000         2.94         000         2.92         000         2.91         001         2.95         000         2.94         000         2.92         000         2.91         001         2.95         000         2.92         000         2.91         001         2.93         000         2.91         001         2.94         000         2.92         000         2.91         001         2.94         000         2.92         000         2.91         001         2.94         000         2.92         000         2.91         001         2.94         000         2.92         000         2.91         001         2.94         000         2.94         000         2.94         000         2.	_	8			-	000	2.77	900		$\vdash$	l			Į		_		-		_	2.87	000	2.94	.000
2.72         .001         2.76         .000         2.91         .000         2.94         .000         2.94         .000         2.92         .000         2.94         .000         2.92         .000         2.91         .001         2.94         .000         2.92         .000         2.91         .001         2.92         .000         2.91         .001         2.92         .000         2.92         .000         2.92         .000         2.91         .001         2.92         .000         2.92         .000         2.91         .001         2.92         .000         2.92         .000         2.91         .001         2.92         .000         2.92         .000         2.92         .000 <th< td=""><td>_ I</td><td>8</td><td></td><td></td><td></td><td>000.</td><td>2.77</td><td>.000</td><td>i</td><td></td><td></td><td></td><td>1 1</td><td>_</td><td></td><td></td><td></td><td></td><td></td><td></td><td>2.87</td><td>000</td><td>2.94</td><td>.000</td></th<>	_ I	8				000.	2.77	.000	i				1 1	_							2.87	000	2.94	.000
2.72         .001         2.76         .000         2.91         .001         2.95         .000         2.94         .000         2.92         .000         2.94         .000         2.92         .000         2.94         .000         2.92         .000 <th< td=""><td>  <b> </b></td><td>8</td><td></td><td>.00</td><td>2.76</td><td></td><td>2.77</td><td>8.</td><td>1</td><td></td><td>l i</td><td><math>\overline{}</math></td><td>i i</td><td>_</td><td></td><td>_</td><td>1  </td><td>_</td><td></td><td></td><td>2.87</td><td>000</td><td>2.94</td><td>900</td></th<>	<b> </b>	8		.00	2.76		2.77	8.	1		l i	$\overline{}$	i i	_		_	1	_			2.87	000	2.94	900
2.72         .000         2.74         .000         2.91         .000         2.91         .000         2.92         .000         2.91         .001         2.92         .000         2.91         .001         2.92         .000         2.91         .001         2.92         .000         2.91         .001         2.92         .000         2.91         .001         2.92         .000         2.91         .001         2.92         .000         2.92         .000         2.91         .001         2.92         .000         2.92         .000         2.91         .001         2.92         .000         2.92         .000 <th< td=""><td>1</td><td>8</td><td></td><td></td><td></td><td>90.</td><td></td><td>900</td><td></td><td></td><td></td><td>-</td><td></td><td></td><td></td><td>_</td><td></td><td>_</td><td></td><td></td><td>2.85</td><td>000</td><td>2.94</td><td>900</td></th<>	1	8				90.		900				-				_		_			2.85	000	2.94	900
2.72         .000         2.77         .000         2.92         .000         2.91         .001         2.94         .000         2.94         .000         2.92         .000         2.92         .000         2.91         .000         2.92         .000         2.91         .001         2.92         .000         2.91         .000         2.92         .000         2.92         .000         2.91         .000         2.92         .000         2.92         .000         2.91         .001         2.92         .000         2.92         .000         2.91         .001         2.92         .000         2.94         .000         2.94         .000         2.91         .001         2.92         .000         2.91         .001         2.92         .000         2.91         .001         2.92         .000         2.91         .001         2.92         .000         2.91         .001         2.92         .000         2.91         .001         2.92         .001         2.91         .001         2.92         .000         2.92         .001         2.91         .001         2.92         .000         2.92         .001         2.91         .001         2.92         .000         2.92         .001 <th< td=""><td></td><td>9</td><td></td><td>98</td><td>_</td><td>000</td><td>2.77</td><td>000</td><td></td><td>_</td><td></td><td><math>\vdash</math></td><td>ľ</td><td>_</td><td></td><td>_</td><td>2.8</td><td>_</td><td>ı</td><td></td><td>2.85</td><td>8</td><td>2.94</td><td>80.</td></th<>		9		98	_	000	2.77	000		_		$\vdash$	ľ	_		_	2.8	_	ı		2.85	8	2.94	80.
2.72         .000         2.76         .000         2.97         .000         2.97         .000         2.97         .000         2.92         .000         2.91         .000         2.97         .000         2.92         .000         2.91         .001         2.97         .000         2.92         .000         2.91         .001         2.97         .000         2.92         .000         2.91         .001         2.92         .000         2.92         .000         2.92         .000         2.91         .001         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.97         .000         2.92         .000         2.97         .000         2.92         .000         2.97         .000         2.92         .001         2.91         .000         2.92         .000         2.92         .000         2.92         .000 <th< td=""><td>ı</td><td>80</td><td></td><td></td><td>2.77</td><td>900</td><td>2.77</td><td></td><td></td><td>I</td><td>1</td><td></td><td></td><td>-</td><td></td><td></td><td>l</td><td>_</td><td>l</td><td>_</td><td>2.85</td><td>8</td><td>2.94</td><td>900</td></th<>	ı	80			2.77	900	2.77			I	1			-			l	_	l	_	2.85	8	2.94	900
2.72         .000         2.77         .000         2.92         .000         2.91         .000         2.91         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.91         .000         2.92         .000         2.91         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.91         .001         2.92         .000         2.92         .000         2.91         .000         2.92         .000         2.92         .000         2.92         .001         2.92         .000         2.92         .001         2.91         .000         2.92         .001         2.91         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000 <th< td=""><td>J</td><td>8</td><td></td><td>90</td><td>2.76</td><td></td><td>2.77</td><td>90.</td><td></td><td>_</td><td></td><td></td><td>1</td><td>Į</td><td></td><td>_</td><td></td><td>_</td><td></td><td>_</td><td>2.84</td><td>98</td><td>2.94</td><td>000</td></th<>	J	8		90	2.76		2.77	90.		_			1	Į		_		_		_	2.84	98	2.94	000
2.72         .000         2.76         .000         2.92         .000         2.91         .000         2.91         .000         2.91         .000         2.92         .000         2.92         .000         2.92         .000         2.91         .001         2.99         .000         2.92         .000         2.91         .001         2.99         .000         2.92         .000         2.91         .001         2.97         .000         2.92         .000         2.91         .001         2.97         .000         2.92         .000         2.91         .001         2.97         .000         2.92         .000         2.91         .001         2.97         .000         2.92         .001         2.91         .001         2.97         .000         2.92         .001         2.91         .001         2.97         .000         2.92         .001         2.91         .001         2.97         .000         2.92         .001         2.91         .001         2.92         .001         2.91         .001         2.92         .001         2.92         .001         2.92         .001         2.92         .001         2.92         .001         2.92         .001         2.92         .001 <th< td=""><td></td><td>8</td><td></td><td></td><td>2.77</td><td>8</td><td></td><td>80</td><td></td><td>_</td><td></td><td>_</td><td>i i</td><td><math>\vdash</math></td><td></td><td>_</td><td></td><td>_</td><td></td><td>_</td><td>2.83</td><td>000</td><td>2.94</td><td>8</td></th<>		8			2.77	8		80		_		_	i i	$\vdash$		_		_		_	2.83	000	2.94	8
2.72         .000         2.76         .000         2.77         .000         2.92         .001         2.99         .000         2.92         .000         2.91         .000         2.99         .000         2.92         .000         2.91         .000         2.91         .000         2.97         .000         2.92         .000         2.91         .000         2.97         .000         2.92         .000         2.91         .000         2.97         .000         2.92         .000         2.91         .000         2.91         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .001         2.97         .000         2.92         .001         2.91         .001         2.97         .000         2.92         .001         2.91         .001         2.97         .000         2.92         .001         2.91         .001         2.92         .001         2.91         .001         2.92         .001         2.92         .001         2.92         .001         2.92         .001         2.92         .001         2.92         .000         2.92         .001         2.92         .001 <th< td=""><td>•</td><td>8</td><td></td><td>90</td><td>2.76</td><td>_</td><td>2.77</td><td>_</td><td></td><td>_</td><td></td><td></td><td>l i</td><td><math>\vdash</math></td><td></td><td>I</td><td></td><td></td><td>2.91</td><td>_</td><td>2.82</td><td>000</td><td>2.94</td><td>.000</td></th<>	•	8		90	2.76	_	2.77	_		_			l i	$\vdash$		I			2.91	_	2.82	000	2.94	.000
2.72         .000         2.76         .000         2.71         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.91         .000         2.97         .000         2.92         .000         2.91         .000         2.97         .000         2.92         .000         2.91         .000         2.91         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .001         2.91         .001         2.92         .000         2.92         .000         2.92         .001         2.92         .000         2.92         .000         2.92         .001         2.92         .000         2.92         .000         2.92         .001         2.92         .000         2.92         .001         2.92         .001         2.92         .000         2.92         .000         2.92         .001         2.92         .001         2.92         .001         2.92         .001         2.92         .001         2.92         .000         2.92         .001         2.92         .000         2.92         .000         2.92         .000         2.92         .001 <th< td=""><td></td><td>8</td><td>_</td><td>99</td><td>- 1</td><td>8</td><td>2.77</td><td><math>\overline{}</math></td><td></td><td></td><td></td><td></td><td>1</td><td>_</td><td></td><td></td><td>Į.</td><td></td><td></td><td></td><td>2.80</td><td>000</td><td>2.94</td><td>.000</td></th<>		8	_	99	- 1	8	2.77	$\overline{}$					1	_			Į.				2.80	000	2.94	.000
2.72         .000         2.76         .000         2.97         .000         2.91         .000           2.72         .000         2.77         .000         2.92         .001         2.93         .000         2.92         .001         2.93         .000         2.92         .000         2.94         .000         2.91         .000           2.73         .000         2.77         .000         2.92         .001         2.93         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92<		ğ		8	2.76	_	2.77	8	1			_		_	1 1	-					2.77	000	2.94	000
2.73         .000         2.76         .000         2.77         .000         2.92         .001         2.97         .000         2.92         .000         2.91         .001         2.97         .000         2.92         .000         2.94         .000         2.91         .001         2.97         .000         2.92         .000         2.91         .001         2.92         .000         2.92         .000         2.92         .000         2.92         .001         2.92         .000         2.92         .000         2.92         .001         2.92         .000         2.92         .000         2.91         .001         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .001         2.92         .000         2.92         .001         2.92         .001         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .001         2.92         .000         2.92         .001         2.92         .000         2.92         .000         2.92         .000         2.92         .000 <th< td=""><td></td><td>8</td><td>_</td><td>.000</td><td></td><td>8</td><td>2.77</td><td></td><td></td><td>_</td><td></td><td></td><td></td><td>1</td><td></td><td>I</td><td></td><td></td><td>İ</td><td>_</td><td>2.74</td><td>000</td><td>2.94</td><td>900</td></th<>		8	_	.000		8	2.77			_				1		I			İ	_	2.74	000	2.94	900
2.72         .000         2.76         .000         2.77         .000         2.92         .000         2.97         .000         2.92         .000         2.91         .001         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .001         2.91         .000         2.92         .000         2.92         .001         2.93         .000         2.92         .000         2.91         .000         2.91         .000         2.92         .000         2.92         .001         2.91         .000         2.92         .000         2.92         .000         2.91         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000         2.92         .000 <th< td=""><td></td><td>8</td><td></td><td>98</td><td>2.76</td><td>8</td><td>2.77</td><td>8</td><td></td><td>_</td><td></td><td></td><td>1</td><td></td><td>li</td><td>-</td><td></td><td>_</td><td></td><td>_</td><td>2.70</td><td>900</td><td>2.94</td><td>000</td></th<>		8		98	2.76	8	2.77	8		_			1		li	-		_		_	2.70	900	2.94	000
2.72         .000         2.75         .000         2.77         .000         2.92         .001         2.92         .000         2.92         .001         2.91         .001         2.92         .000         2.92         .000         2.91         .001         2.93         .000         2.92         .000         2.91         .001         2.93         .000         2.92         .001         2.91         .001         2.93         .000         2.92         .000         2.91         .001         2.93         .000         2.94         .000         2.91         .001         2.90         .000         2.92         .001         2.91         .001         2.90         .000         2.92         .001         2.91         .001         2.90         .000         2.92         .001         2.91         .001         2.90         .000         2.92         .001         2.91         .001         2.92         .001         2.92         .001         2.92         .001         2.92         .001         2.92         .001         2.92         .001         2.92         .001         2.92         .001         2.92         .000         2.92         .000         2.92         .000         2.92         .000 <th< td=""><td></td><td>8</td><td></td><td>900</td><td></td><td>_</td><td>2.77</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>_</td><td></td><td>_</td><td>2.64</td><td>000</td><td>2.94</td><td>8</td></th<>		8		900		_	2.77											_		_	2.64	000	2.94	8
2.73         .000         2.75         .000         2.77         .000         2.92         .001         2.93         .000         2.92         .000         2.91         .001         2.93         .000         2.92         .000         2.91         .000         2.93         .000         2.92         .000         2.91         .000         2.92         .000         2.92         .000         2.92         .001         2.91         .001         2.90         .000         2.92         .001         2.91         .000         2.91         .000         2.91         .000         2.91         .000         2.91         .000         2.91         .000         2.92         .001         2.94         .000         2.91         .000           2.73         .000         2.77         .000         2.92         .001         2.94         .000         2.94         .000         2.91         .000		90.		000	2.76	_	2.77	900.		_		-	1			_	j	-	i	-	2.51	8	2.94	80
2.73         .000         2.78         .000         2.77         .000         2.92         .001         2.91         .001         2.95         .000         2.92         .000         2.91         .001         2.90         .000         2.92         .000         2.91         .001         2.90         .000         2.92         .000         2.91         .001         2.94         .000         2.92         .001         2.91         .001         2.94         .000         2.92         .001         2.91         .001         2.94         .000         2.92         .001         2.91         .001         2.94         .000         2.92         .001         2.91         .001         2.94         .000         2.94         .000         2.91         .001	1	8		980		$\blacksquare$	2.77	$\blacksquare$		Į			1					_		_	2.49	.037	2.%	98
2.73     .000     2.78     .000     2.77     .000     2.92     .001     2.91     .001     2.90     .000     2.92     .000     2.91     .000     2.91     .000     2.91     .000     2.91     .000     2.91     .000		8	_	.000	2.78	_	2.77	_		_		_	i			_		_	1	_	2.33	.224	2.94	900.
2.73 .000 2.76 .000 2.77 .000 2.92 .001 2.91 .001 2.94 .000 2.92 .000 2.94 .000 2.91 .000	1	90.	2.73	900	2.78				1		. 1			2000	i						2.24	.630	2.94	990
		_	_	900	2.76		_			_		_		2000							2.03	.874 2	2.94	000

DESENSITIZATION EFFECT ON MARKER RECEIVER NUMBER TWO'S LAMP VOLTAGE (INTERFERENCE: F1 AND F2)

				L MP	LAMP VOLTAGE							LAMP VOLTAGE	LTAGE			-			-	LAMP VOLTAGE	L TAGE			
				t	(ADC)			_				(VDC)	Ç							(VDC)	Ç			
F1/F2			હ	ter Ma	(Outer Marker Mode)	(ego					(Nida	ile Mar	(Hiddle Narker Mode)	<del>Ş</del>						r Mark	(Inner Marker Mode)	<b>•</b>		
Signal			<b>±</b> 00 <b>†</b>	ertz 1	400 Mertz Interference	rence				-	1300 He	irtz In	1300 Hertz Interference	auce				•	900 ¥	rtz In	3000 Hertz Interference	auce		
Level				F1 AND	ID F2 ON	_						F1 AND F2 ON	F2 ON							F1 AND	F1 AND F2 ON			
	¥	_	H	_	₹	Ţ	<b>7</b> 50		W	_	F		₹		3		₹		FH		¥		3	
	ક	off	۶	off	8	off	8	off	۶	off	۶	off	۶	off	۶	off	۶	off	۶	ott	٤	) je	8	off
Basel ine	5.45	.001	5.33	.001	5.49	.001	5.38	.001	5.44	.001	5.41	100.	5.71	.001	5.36	000	5.38	90.	5.39	000	5.61	8	5.48	8
07-	5.54	.001	17.5	.001	5.55	.001	2.48	.001	27.5	100.	5.51	.001	5.68	.001	5.46	000.	5.46	000	5.43	000	5.57	000	5.45	8
-35	5.51	100.	5.38	.001	5.53	.001	5.50	.001	27.5	.001	5.49	.001	5.66	.001	5.43	000	5.43	000	5.41	000	5.56	000	5.50	8
93.	15.51	100.	5.39	100.	5.51	.001	5.50	.001	27.5	100.	5.48	.001	5.65	.001	5.43	000:	5.45	000	5.41	000	5.56	000	5.49	8
-25	5.51	100.	5.39	.001	5.51	.001	5.44	.001	97.5	.001	5.48	100	5.64	.001	5.42	000	5.42	900	5.41	90	5.56	8	5.48	8
-20	5.51	.001	5.39	.001	5.53	.001	5.51	.001	97.5	.00	5.47	100.	5.63	100	5.42	000.	5.42	8	5.42	000	5.57	000	5.48	8
-15	5.52	100.	5.38	.001	27.5	.001	5.51	.001	97.5	100.	5.47	.001	5.62	.001	5.42	000	5.41	000	5.42	000	5.57	000	5.47	8
-14	5.52	.00	5.39	.001	5.50	.001	5.51	.001	5.46	100.	5.46	.001	5.61	.001	5.42	000	5.45	.000	5.45	000	5.57	000	5.47	900
-13	5.53	.00	5.39	.001	5.52	.001	5.51	.001	5.46	100.	5.46	.001	5.60	.001	5.45	000	5.37	900	5.45	000	5.58	000	5.48	8
-12	5.50	.001	5.38	.001	9.60	.001	5.51	.001	2.46	.001	5.46	100	5.60	.001	5.42	000	5.41	000	5.45	000	5.59	900	5.48	8
-11	5.45	.001	2.40	.001	9.60	.001	~	.001	27.5	.001	5.47	.001	5.58	.001	5.42	000	5.45	900	5.41	8	5.59	8	5.48	8
-10	5.53	.001	2.40	.001	5.60	.001	5.52	.001	87.5	100.	5.46	.001	5.57	.001	5.42	000	5.35	000.	5.45	000	5.58	000	5.48	g
6-	5.53	100.	5.39	.001	5.61	.001	5.51	.001	27.5	100.	5.46	100.	5.56	.001	5.43	000	5.42	90.	5.45	8	5.57	ş	5.46	8
8-	5.53	.00	5.39	.001	5.60	.001	5.50	.001	25.67	.001	97.5	90.	5.55	8	5.43	8	5.45	Š	5.43	8	5.56	8	5.49	8
.7	5.53	100.	5.39	.001	5.59	.001	5.49	.001	2.47	.001	5.46	9.	5.55	8	5.43	§.	5.41	g	5.43	8	5.53	8	5.49	8
9-	5.52	100	5.39	.001	5.59	.001	5.49	.001	5.47	.00	5.46	8	5.54	9.	5.43	80.	5.38	8	5.43	8	5.57	8	5.50	8
-5	5.52	.001	5.38	.001	5.59	.001	5.43	.001	5.45	.00	5.46	.001	5.54	.001	5.43	8	5.39	20.	5.42	8	5.56	8	5.51	8
4-	5.52	100.	5.39	.001	5.58	.001	5.47	.001	5.45	.010	5.46	.001	5.53	.003	5.42	000	5.38	2.82	5.32	8	5.53	8	5.51	8
-3	5.52	.001	5.37	.00	5.58	.001	5.51	.00	5.44	4.91	5.46	9	5.54	.007	5.43	8	5.45	5.36	5.43	8	5.16	8	5.52	98
-5	5.53	.003	5.39	.00	5.55	.001	5.45	.001	5.51	5.51	5.46	.001	5.57	908	5.39	000	5.44	5.43	5.42	8	3.63	8	5.52	8
1.	5.52	2.%	5.40	100.	5.56	.001	5.50	.001	5.51	5.52	5.45	.00	5.58	88	5.41	00	5.45	5.46	5.45	900	1.30	8	5.52	8
0	5.56	5.48	5.40	.00	5.55	.005	5.52	.001	5.52	5.52	5.45	.001	5.57	.008	5.43	000	5.48	5.48	5.42	00	<u></u>	00	5.53	90

DESENSITIZATION EFFECT ON MARKER RECEIVER NUMBER TWO'S LAMP VOLTAGE (INTERFERENCE: F1 ONLY)

				Sep.	LAMP VOLTAGE							LAMP VOLTAGE	A TAGE							LAMP VOLTAGE	LTAGE			
				ટ	(ADC)							E	(ADC)							(ABC)	3			
F1/F2			3	ter Ma	(Outer Marker Mode)	ode)					(Nigh	dle Hai	(Middle Marker Mode)	ê ê						r Mark	(Inner Marker Mode)	<u>.</u>		
Signal			¥ 00 <b>7</b>	ertz 1	400 Hertz Interference	rence					1300 N	ertz li	1300 Nertz Interference	euce				100	3000 He	irtz In	3000 Hertz Interference	auce auce		
Level			"	4	F1 ON AND F2 OFF	OFF.					•	1 OK A	F1 ON AND F2 OFF	<u></u>						N N	F1 ON AND F2 OFF			
	*	*	H	_	He	_	3	-	7	<b>V</b>	FM	_	₹		3	_	₹		E		£		3	
	۶	off	ક	off	ક	off	۶	off	8	off	8	off	ક	off	ક	off	8	off	ક	off	8	off	ક	off
Baseline	5.38	.001	5.37	.001	4.92	.001	5.48	.001	5.45	.001	5.43	.001	5.48	900.	5.32	000	5.46	900	5.41	900	5.51	000	5.50	8
07-	5.46	.001	5.42	.001	5.37	.001	5.54	100.	5.52	100.	5.46	100.	5.54	900.	5.45	.000	5.48	.000	5.46	.000	5.53	000	5.57	8
-35	5.44	100.	5.40	.001	5.32	.001	5.50	.001	5.48	100.	5.44	.001	5.51	.000	5.43	000	5.45	000	5.43	000	5.50	000	5.53	8
-30	5.44	.001	5.38	100.	5.34	.001	67.5	.001	2.47	8.	5.43	100.	5.41	000	5.43	000	5.45	000	5.43	000	5.50	000	5.54	900
-25	5.44	.001	5.39	.001	5.33	.001	5.49	.001	2.47	.001	5.43	100.	5.25	000.	5.43	900	5.44	.000	5.45	000	5.50	000	5.51	8
-20	5.43	.001	5.38	.001	5.35	.001	5.49	.001	5.48	.001	5.43	.001	5.48	000	5.43	.000	5.44	000.	5.42	000	5.50	8	5.53	8
-15	5.44	.001	5.39	.00	5.36	.001	67.5	100.	87.5	.001	5.43	.001	5.49	.000	5.43	000.	5.44	000	5.45	000	5.49	000	5.53	80
-14	5.44	100.	5.39	.001	5.36	.001	67.5	.001	5.48	100.	5.43	100.	5.51	000.	5.44	.000	5.44	000.	5.42	000	5.50	000	5.53	90.
-13	2.44	.001	5.40	.001	5.36	.001	5.48	.001	5.48	.001	5.43	.001	5.50	000	5.43	900	5.44	000.	5.45	000	5.50	000	5.49	8
-12	5.45	100.	5.37	.00	5.37	.001	2.48	.001	2.47	.001	5.45	.001	5.47	.000	5.44	.000	5.43	000:	5.42	000	5.49	80	5.53	8
-11	2.46	100.	5.37	.001	5.37	.001	5.47	.001	67.5	.001	5.43	.00	5.51	000	5.44	000	5.43	000	5.42	000	5.46	8	5.52	8
-10	5.45	.00	5.34	.001	5.38	.001	27.5	.001	97.5	.001	5.43	.001	5.56	000	5.45	.000	5.43	000.	5.41	000	5.46	000	5.52	8
6-	5.46	.00	5.37	.001	5.39	.001	5.45	.001	5.47	.001	5.45	.001	5.59	99.	5.45	990	5.43	8	5.41	8	5.49	80	5.52	8
8-	5.46	.001	5.41	.001	5.39	.001	2.47	.001	5.46	.001	5.45	.001	5.57	8	5.45	8	5.43	8	5.40	8	5.49	8	5.53	g
-7	5.47	.00	5.41	.001	5.40	.001	5.48	.001	5.46	.001	5.45	8	5.59	8	5.45	8	5.45	8	5.41	8	5.49	8	5.52	8
9-	5.47	.00	5.41	.001	5.39	.00	5.47	.001	5.46	.00	5.45	8	5.58	8	5.45	8	5.41	000	5.41	8	5.49	8	5.52	8
-5	5.47	.001	5.35	100.	5.40	.001	5.45	.001	5.46	.001	5.43	8	5.57	900	5.46	900	5.41	000	5.45	8	5.49	8	5.45	8
7-	5.47	.001	5.41	.001	5.37	.001	5.44	.001	5.46	.001	5.41	.00	5.37	000	5.46	000	5.41	80.	5.45	80	5.48	80	5.52	8
-3	5.48	.001	5.40	.001	5.38	.001	5.45	.001	5.46	.001	5.43	.001	5.57	000	5.45	000	5.42	000	5.41	80	5.44	8	5.52	8
-5	5.28	.00	5.41	.001	5.40	.001	5.46	.001	5.45	.001	5.42	100	5.57	8	5.46	99.	5.41	80	5.41	8	5.22	8	5.52	8
.1	2.47	.001	5.45	.001	5.41	.001	97.5	.001	5.45	100.	5.42	.00	5.56	8	5.46	80.	5.42	000	5.41	000	4.41	80.	5.53	8
0	27.5	100.	5.43	100.	17.5	.001	97.5	.001	5.45	.005	5.45	.001	5.57	.001	5.46	.000	5.39	.057	5.41	000	1.90	000	5.52	000
				1		1																		

DESENSITIZATION EFFECT ON MARKER RECEIVER NUMBER TWO'S LAMP VOLTAGE (INTERFERENCE: F2 ONLY)

				077	TACE								200						[					
											-	LAMP VOLIAGE	5							LAMP VOLIAGE	X IAGE			
				Ξ	(20)							S	(ADC)							Ξ	(ADC)			
F1/F2			<u></u>	Iter 192	(Outer Marker Mode)	(age					(Nigh	dle Mai	(Middle Narker Mode)	ş					2	er Mari	(Inner Marker Mode)	æ		
Signal			904	lertz 1	400 Nertz Interference	rence					1300 H	ertz Ir	1300 Hertz Interference	ence					3000 Hertz Interference	ertz Ir	nterfer	ence		
Level				1 0FF	F1 OFF AND F2 ON	8					14.	F1 OFF AND	NO F2 ON	8				٠.	F	OFF /	FI OFF AND F2 ON	3	;	
	_	¥	۱۵.	Œ	_	₹	5	<b>&gt;</b>	*	_	<b></b>	_	₹		3	_	₹	_	푼	_	E		5	
	۶	off	۶	ŧ	ક	off	ક	ţ,	ક	off	۶	off	۶	off	۶	off	8	off	8	off	۶	off	۶	off
Basel ine	5.43	<u>8</u>	2.40	8.	5.38	.001	5.45	8	5.45	.001	5.39	.001	5.54	.001	5.45	.000	5.13	900	5.37	§.	5.45	8	5.52	8
04-	5.5	8	5.45	100.	5.40	.001	5.50	8	5.47	.001	5.43	.001	5.53	.001	5.50	000	5.25	8	5.43	8	5.51	§.	5.56	99.
-35 55	2.47	ş	5.41	.00	5.39	.001	5.45	.001	5.46	.001	5.41	100.	5.50	199.	5.48	8	5.23	8	5.41	8	5.50	8	5.53	80.
.30 .30	2.47	8	5.41	.001	5.38	.00	9.46	8	5.46	.001	5.41	.001	5.49	100.	5.48	000	5.24	8	5.41	ş	5.49	8	5.47	99.
Ş	2.47	ğ	5.41	8	5.37	9.	5.47	.001	5.46	.001	5.41	100.	5.46	100.	5.48	000.	5.25	<u>00</u> .	5.41	8	5.48	98.	5.53	8
25	2:42	8	5.41	8.	5.37	9.	5.47	.001	5.44	.00	5.45	.001	5.46	.001	5.47	000.	5.25	000.	5.40	900	5.48	000	5.52	8
-15	5.46	8.	5.37	.8	5.37	.001	2.47	.001	5.43	.001	5.45	100.	5.44	100	5.47	86.	5.25	8	5.40	8	5.48	8	5.53	8
7	5.46	8	5.41	100.	5.37	.001	25.47	.001	5.45	100.	5.45	100.	5.45	8	5.46	8	5.26	g	5.41	8	5.47	8	5.53	§.
:	5.46	ş	5.38	.001	5.37	.001	5.47	.001	5.45	.001	5.45	.001	5.45	.09	1 1	99.	5.27	8	5.41	8	2.47	8	5.53	8.
27	5.46	ē.	5.41	ğ	5.37	8.	5.47	9.	5.42	100	5.45	100	5.45	.001	5.47	000	5.27	000	5.41	990	5.47	990	5.52	8
=	5.46	ğ	5.31	ğ	5.38	8	5.46	.001	5.45	.00	5.45	.001	5.46	.001	5.47	000.	5.28	000	5.41	000	5.47	90.	5.53	99
<u>e</u>	5.46	8	5.39	ğ	5.38	.00	5.46	100	5.45	.00	5.45	100	5.45	.001	5.46	000	5.29	000	5.41	900	5.46	000	5.51	8
٥	5.46	8	5.40	8	5.38	8.	5.45	190	5.45	8	5.45	100	5.44	100	5.46	.000	5.30	000.	5.40	000	5.44	000	5.52	900.
40	2.46	ē	5.41	ë	5.39	8	5.45	8	5.44	8	5.41	.00	5.45	.001	5.47	.000	5.31	000	5.40	000	5.46	000	5.52	900
·	5.46	ē	5.37	ğ	5.39	8	5.45	100	5.43	8	5.41	100	5.46	.001	5.46	.000	5.31	000.	5.40	000	27.5	000	5.51	000
٩	5.45	횽	5.41	g.	5.39	<u>8</u>	5.45	9.	5.39	100.	5.45	100	5.46	.001	5.46	000	5.32	000	5.40	00	5.46	80.	5.51	8
5-	2.46	ē	5.41	8	5.39	8	5.45	90.	5.39	9	5.42	.001	5.46	.001	5.46	000.	5.33	000	5.41	000	5.46	000	5.50	8
4	5.46	ğ	5.40	8	5.39	8	5.45	8	5.43	8	5.45	.001	5.45	.001	5.46	.000	5.34	000	5.40	000	5.45	000	5.50	8
	5.46	ē	5.40	8	5.35	8	5.45	9.	5.40	8	5.42	.001	5.46	.001	5.48	000	5.33	000	5.40	000.	5.44	000	5.50	8
?	5.46	ğ	5.40	8	5.39	ŝ	5.45	99.	5.39	90	5.42	.001	5.46	100	5.48	000	5.33	.000	5.40	000	5.35	000	5.49	000
-	5.44	8	5.41	8	5.36	18	5.45	100.	5.38	9	5.42	.00	5.46	.001	5.48	000	5.32	.001	5.40	000	2.72	000	5.47	90.
•	5.44	8.	5.40	19	5.39	.09	5.45	.00	5.41	.013	5.42	.001	5.46	.001	5.47	.000	5.32	. 152	5.41	000.	. 184	000.	5.51	900

DESENSITIZATION EFFECT ON MARKER RECEIVER NUMBER THREE'S LAMP VOLTAGE (INTERFERENCE: F1 AND F2)

	L			ONV	TAME VOLTACE								100			r							
					יייי אפר אפר אפר אפר אפר						-	LAMP VOLIAGE	r i Aue						3	LAMP VOLTAGE	IAGE		
				٥ ا	(AAC)							(VAC)	Ç							(VAC)	~		
F1/F2			ટુ	iter Ma	(Outer Marker Mode)	(age					(Nick	(Middle Marker Mode)	ker Mo	de)					Cline	. Marke	(Inner Marker Mode)		
Signal			¥00	ertz	400 Mertz Interference	rence				-	1300 K	1300 Nertz Interference	terfer	ence				M	900 Her	tz Int	3000 Hertz Interference	ě	
Level				FIAN	F1 AND F2 ON						į	F1 AND F2	F2 ON						_	F1 AND	F2 ON		
	<	Ę	Œ		¥	<u> </u>	3	-	₹	,	Œ		₹		3		₹		Ξ	<u> </u>	₹	_	3
	ક	off	ક	ŧ	ક	off	۶	off	ક	off	8	off	۶	off	8	off	8	off	8	off	on off		on off
Basel ine	.024	.014	.024	,014	.023	.015	.023	.012	.032	.014	.033	.014	.027	.015	.032	.012	. 026	.013	. 027	. 210.	0. 150.	.015	110. %
07-	8	.04	.024	.014	.023	.015	.022	.012	.032	.014	.032	.014	.027	.015	. 032	.012	.026	.013	.027	. 210.	.031	.015	
-35	.023	.014	720.	.014	.023	.015	.022	.012	.031	.014	.033	.014	. 027	.015	.032	.012	.026	.013	. 027	. 210.	.031 .0	.015	110. 9
-30	29.	710.	.024	.03	.023	.015	.022	.012	.031	.015	.032	.014	. 026	015	.031	.012	.026	94.	. 027	.014	.031	.015	5 .011
Ş	.023	.035	.02	.015	.023	.015	.022	.012	.031	.016	.031	.014	. 026	. 015	.030	.012	. 025	.015	. 027	.014	.030	.016	5 .012
Ŗ	.022	.017	220:	.016	.023	.017	.020	.013	.029	.020	.028	.016	. 025	.017	. 028	.013	. 025	.017	. 920	. 210.	.029	.019	3 .012
-15	120.	.019	950	-012	.024	.018	.018	.013	.029	.023	.025	.018	. 025	.019	. 023	.013	. 022	.020	. 920	0. 910.	120. 820.	12 .020	0 .012
÷1.	120.	89	89.	.017	.024	.018	710.	.013	.025	.024	.024	.018	. 025	.019	.021	.012	. 025	.021	. 120.	. 710.	120. 820.	810. 13	8 .012
:13	.021	89.	020	-00	720.	.019	.016	.012	.027	.024	.023	.018	. 025	.019	. 010.	.012	. 022	.021	.024	. 710.	.028 .022	710. 52	210. 7
2	120.	.0 <u>2</u>	.019	5	720.	65	.015	.012	.026	.024	.022	.018	. 025	. 020	. 017	.012	.021	.021	. 710.	0.   210.	.028 .022	22 .015	5 .012
÷	.02	80.	918	95	720.	.019	.014	.012	.027	720.	.020	.018	. 025	. 020	. 015	.012	. 024	.022	. 710.	0. 710.	.028 .023	23 .014	4 .012
÷	.020	ę.	.018	6.	720.	.019	.013	.012	.023	.021	.021	.019	. 025	. 020	.014	.012	. 010.	. 020	.018	0.810.	.028 .023	23 .013	3 .012
٩	.020	86	.018	6.	720.	610.	.013	.012	.024	.021	.020	.019	. 025	. 020	.013	.012	. 010.	. 019	. 810.	0. 810.	.028 .023	53 .013	3 .012
<b>5</b>	.0 <u>%</u>	8	928	-01	.024	90.	.012	.012	.023	.020	.020	.020	. 025	.020	.013	.012	.018	. 019	. 710.	0. 810.	.028 .023	210. 89	2.012
·	.019	.018	.017	5	.024	95	.012	.012	.023	.020	.020	.020	. 025	. 020	.012	.012	. 710.	. 019	. 710.	0. 810.	.028 .024	210. 24	210. 2
۹	.019	20.	9	6	.024	6	.012	.012	.022	.020	.020	.020	.024	. 020	.012	.012	. 810.	.018	.018	0.810.	.028 .024	210. 24	2 .012
Ş	.02	6	95	210.	720.	95	.012	.012	.023	.019	.021	.020	. 025	.020	. 210.	.012	. 016	.018	. 810.	0. 810.	.028 .024	210. 24	210. 2
,	.020	20.	.018	ē.	.024	.019	.012	.012	.021	.019	. 020	.020	. 025	. 020	.012	.012	. 023	.017	. 910.	0. 610.	.028 .024	210. 2	210. 2
÷	.023	96.	910	810.	20.	.03	.012	.012	.019	.018	. 020	.021	. 025	. 020	. 210.	.012	. 019	. 017	.018	0.019	.028 .024	210. 2	210. 5
?	99	910.	95	.018	.025	99	.012	210.	.019	.018	. 021	. 021	. 025	. 020	.012	. 012	. 020	. 017	. 910.	0. 610.	.028 .024	210. 2	2.011
-	520.	.016	999	910.	.024	95	210:	.012	.018	.017	. 021	.021	. 220	. 020	. 210.	.012	. 015	. 016	.019	.019	.028 .024	4 .012	2 .012
٥	.021	.015	.018	.018	70.	6.	.012	-012	.018	.017	. 021	.021	. 024	. 020	. 510.	. 012	. 019	. 016	.019	.019	.028 .024	210. 2	2 .012

DESENSITIZATION EFFECT ON MARKER RECEIVER NUMBER THREE'S LAMP VOLTAGE (INTERFERENCE: F1 ONLY)

				Z BE	LAMP VOLTAGE	<b></b>							LAMP VOLTAGE							LAMP VOLTAGE	X TAGE			
				Ξ	(VAC)							ε	(VAC)							3	(VAC)			
F1/F2			g	iter M	(Outer Marker Mode)	tode)	•				(H	Adle Ma	(Middle Marker Mode)	ode)					Ē	(Inner Marker Mode)	ker Mo	ě,		
Signel			H 007	ertz 1	400 Hertz Interference	rence					1300	lertz 1	1300 Hertz Interference	rence					3000 Hertz Interference	ertz 14	nterte	ence		
Level				8	FI ON AND F2 OFF	OFF.					-	F1 ON A	AND F2 OFF	OFF					•	F1 ON A	AND F2 OFF	JF.		
	<u> </u>	Į.	£	<b>*</b>	<u>.</u>	¥	ى 	3		₹	<u>.</u>	Æ	Æ	_	3	_	¥	_	¥.		₹		3	
	8	ţ	۶	off	ક	ţ	8	ţ	8	off	۶	off	ક	off	8	off	5	off	ક	off	۶	off	۶	off
Basel ine	20.	.04	.023	.014		.016	.022	.012	.032	.014	.033	.014	.032	.015	.031	.011	.026	.013	.027	.014	.027	.016	.025	.011
97	720.	.014	.024	.014	29	.016	277	.012	.032	.014	.033	.014	.032	.015	.031	.011	920.	.013	.027	710.	.027	910.	.025	110.
ë	720.	.014	.024	.014	.025	.016	.022	.012	.031	.014	.033	.014	.032	.015	.031	110	.026	.013	.027	.014	.027	910.	.025	110.
R	.023	.014	.024	.014	.024	.016	.022	.012	.031	.014	.032	.014	.032	.015	.031	.011	970.	.013	.027	.014	920.	.016	.025	.011
'n	.023	.014	.023	.04	.024	9:0.	.021	.012	.030	.014	.031	.014	.031	.016	.029	.011	.025	.013	.026	.014	.026	.016	.024	.011
۶	-02	.015	۶	.01	<u>ي</u>	.016	.020	.012	.028	.015	.028	.014	.029	710.	.02	.011	.023	.014	.022	.014	.024	.017	.022	.011
-15	6	.015	.03	.016	.022	.016	.016	.05	.023	.015	.023	.018	.026	.017	.018	.011	.020	.014	.018	.016	.022	.018	.016	.011
ž	.019	.015	.018	6.	.02	.016	.015	.012	.021	.014	.022	.019	.025	.018	.016	.011	.020	.014	.022	.017	.022	.018	.015	.011
÷.	.018	.015	.018	-01	.02	710.	6.	.012	.020	.015	.022	.020	.025	.018	.015	.011	.019	.014	.018	.018	.022	810.	.013	.011
-12	.017	.035	.019	919	.020	.017	.e.	.0:	.00	.015	.022	.022	.025	.019	.013	110.	.016	.014	.019	910.	.022	.019	.013	.011
÷	.017	-03	.019	65	2	:03	.013	.012	9	.015	.023	.023	.025	.020	.012	.011	.019	.014	.018	.020	.022	.020	.012	.011
٩	710.	.016	.019	919	.021	.019	.012	.012	.019	.017	.024	.025	.024	.021	.012	.011	.017	.016	.020	.021	770.	.020	.01	.011
٥٠	.017	96.	.019	80.	.021	.020	-01	.012	.03	.018	.025	.025	970.	.023	.011	.011	.019	.017	.022	.022	.022	.021	.011	.011
80	810.	-03	.020	020	.02	20.	.012	.012	<u>8</u> .	.020	.025	.026	.026	.024	.011	.011	.019	.018	.021	.022	.023	.022	.011	.011
<i>'</i>	.018	910.	.020	020	.022	-022	.012	.012	20.	.021	.026	.026	.027	.026	.011	.011	.019	.019	.022	.022	.024	.023	.011	.911
9-	.019	919	.020	020	.022	:03	.012	.03 197	.022	.022	.026	.026	.028	.028	.011	.011	.017	.019	.022	.023	.024	.024	.011	.011
Ž	.019	<u>6</u>	.020	89.	.024	.024	.012	-05	.023	.023	.026	.026	620	.030	.011	.011	.021	.020	.023	.023	.025	.025	.011	.011
*	.019	99	.020	89.	.025	.0 <u>2</u>	.012	.012	.024	.024	920.	920.	030	.031	.01	.011	.021	.020	.023	.023	.025	970.	.011	.011
<u>ن</u>	.019	9	.020	020	520:	920.	210.	.012	.024	.024	.026	.027	50.	.032	.011	.011	.019	.021	.023	.023	.026	.026	.011	.011
?	.019	<u>8</u>	. C.J.	0Zŋ:	920.	.027	.012	.012	720.	.025	920.	970.	.031	.033	.011	.011	.021	.021	.023	.023	970.	720.	٠11	110.
-	.020	020.	.020	020	.026	.027	.012	.012	.024	220.	920.	.026	. 032	.033	.011	.01	.021	.021	.023	.023	.026	.027	115	.011
0	.019	020	020	020	700	020	043	010	/60	360	,	, 00				ľ								

DESENSITIZATION EFFECT ON MARKER RECEIVER NUMBER THREE'S LAMP VOLTAGE (INTERFERENCE: F2 ONLY)

				LAMP	LAMP VOLTAGE							LAMP VOLTAGE	X TAGE			-			3	LAMP VOLTAGE	LTAGE			
				S	(VAC)							Š	(VAC)							(VAC)	G			
F1/F2			3	ter Ma	(Outer Marker Mode)	(age					(Hid	(Middle Marker Mode)	rker Mo	<b>e</b>					Clme	r Mark	(Inner Marker Mode)	<b>a</b>		
Signet			¥004	ertz l	400 Hertz Interference	rence					1300 H	1300 Hertz Interference	iterfer	ence				M	000 Ke	rtz In	3000 Hertz Interference	a)Ce		
Level			4	1 OFF	F1 OFF AND F2 ON	8			i		•	F1 OFF AND F2		8					F1	F1 OFF AND F2	ND F2 (	8		
	_	*	FR	7	¥	7	3	3	₹	<b>-</b>	Œ	-	₹		3		AM		F		P		3	
	۶	off	۶	off	۶	off	ક	off	۶	off	ક	off	۶	off	۶	off	۶	off	۶	off	ક	off	۶	off
Basel in:	.023	.014	.023	.014	.024	.013	.022	.012	.031	.014	.032	.014	920.	.013	.031	.011	920	.013	. 027	.014	.031	.013	.025	.011
07-	.023	<b>,014</b>	.023	.014	<b>720</b> .	.013	.022	.012	.031	.014	.032	.014	.026	.013	.031	.011	.026	.013	. 028	.014	.031	.013	.025	.011
-35	.023	.014	.023	.014	.024	.013	.022	.012	.031	.014	.032	.014	.026	.013	.031	.011	. 026	.013	. 028	.014	.031	.013	.025	.011
-30	.023	.014	.023	.014	.023	.013	.022	.012	.031	.014	.032	.014	.026	.013	.031	.011	.027	.014	. 027	.014	. 030	.013	.025	.011
-25	.023	.015	.023	.014	.024	.014	.022	.012	.031	.016	.032	.014	.027	.013	.031	.011	.027	.015	. 027	.014	.030	.014	.025	.011
-20	.025	.018	.023	.014	.024	.016	.022	.012	.032	.022	.031	.014	.027	.016	.030	.011	.029	610.	.027	.014	.031	.018	.025	.01
-15	.026	.021	.021	.014	.026	.022	810.	.012	.031	720.	.029	.014	.028	.022	.024	.011	.030	.025	. 027	.014	.031	.024	.021	.011
-14	.025	.022	.020	.014	.027	.023	.017	.012	.032	.028	.026	.014	.028	.023	.021	.011	.025	.025	. 024	.014	.032	. 025	.019	011
-13	.025	.022	810.	.014	.027	.024	.015	.012	080.	.028	.023	.014	.026	.024	.019	.011	.015	.026	. 022	.014	.032	. 027	.017	.011
-12	.025	.022	.017	.014	.026	.024	.014	.012	.030	.028	.021	.014	.029	.025	.016	.011	.023	970.	020	710.	.033	.028	.015	10
-11	.022	.021	.015	.014	.025	.025	.013	.012	.029	.026	.018	.014	.029	.025	.014	.011	.020	.024	.017	.014	.033	.028	.013	5
-10	.024	.021	.015	.014	.027	.025	.012	.012	.028	.026	.017	.014	.030	.026	.013	110.	.031	.024	.016	710	.033	620:	210.	5
6-	.024	.021	.015	.014	.027	.026	.012	.012	.029	.026	.016	.014	.027	.026	.012	.011	020	770.	.016	710.	.033	80.	.012	티
89	.022	.021	.014	.014	.031	.026	.012	.012	.027	.026	.015	76.	.030	970.	.012	<u></u>	150	.024	210.	.014	.034	.030	.012	9
-7	.022	.021	.015	.014	.030	.026	.012	.012	.028	.025	.015	.014	.030	970.	.012	<u>.</u>	910	.023	.015	710.	.034	.030	10.	<u>=</u>
9-	.026	120.	.014	.014	.031	.026	.012	.012	.026	.025	510	29.	.029	.027	9.	5	.030	.023	.015	710.	.034	.030	10.	5
-5	.024	.021	.014	.014	.031	.026	.012	.012	.023	.024	.015	.03	.028	.027	5	10.	016	220.	.015	.015	.034	.030	110.	10.
7-	.025	.021	.015	.014	.026	.026	.012	.012	.024	.023	.015	.015	.024	.027	110.	110	.016	.022	.015	210.	.034	.030	10.	9
-3	.026	.020	.014	.014	.027	.027	.012	.012	.023	.023	.015	.015	970.	.027	10.	5	670	120.	.015	210.	.034	.031	10.	5
-2	.022	.020	.015	.014	.031	.027	.012	.012	.022	.022	.015	.015	030	720	10.	10.	.026	120.	.015	.015	.034	.031	10	=
-	.022	020	.014	.014	.026	720.	.012	.012	.021	120.	55	.015	.029	.027	19	5	.016	.020	.015	.015	.034	.031	110	19.
0	.023	910.	.014	.014	.027	.027	.012	.012	.020	120.	.015	.01	150.	.027	10.	10.	.014	610.	.015	.015	.034	.031	10.	.011

DESENSITIZATION EFFECT ON MARKER RECEIVER NUMBER FOUR'S LAMP VOLTAGE (INTERFERENCE: F1 AND F2)

					3	on off	.417 .009	417 .009	.417 .009	417 .009	417 .009	417 .009	.417 .009	417 .009	.417 .009	417 .009	.417 .009	417 .009	417 .009	417 .009	417 .009	417 .009	417 .009	417 .009	417 .009	417 .009	417 .009	ı
		_	92		-	off	. 210	. 210.	. 210	. 015	. 015	7 667	301 .4	302 . 4	⊢	298	. 293	288	. 182.	260 .4	. 236 . 4	. 207	↓_	4. 9/1.	4. 21.	7. 921.	7. 721.	
TAGE	_	r Node	erfere	F2 ON	₹	8	. 421	. 124.	. 124.	. 124.	. 124.	420	. 124.	. 422	. 421	. 422	. 423	2. 714.	7. 707	399 .2	.388	. 178.	367	343 .1	.315	285 .1	1. 255.	
LAMP VOLTAGE	(VAC)	(Irner Marker Mode)	tz Int	F1 AND F2 ON	_	off	.014	.014	. 110.	.014	. 410.	.014	. 210.	7. 710.	. 410.	. 210.	,014	.014	.014	.014	.014	. 410.	.014	.014	.014	.014	.014	
5		(Inner	3000 Hertz Interference	•	Œ	8	.428	. 426	. 426	. 426	. 426	. 426	. 426	. 426	. 426	. 426	. 427	.428	.428	.428 .0	.428 .0	.428 .0	.428 .0	.428 .0	.428 .0	.428 .0	. 427	
			R		-	off	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	. 013	. 013	.013	.013	.013	.013	. 013	. 613	ļ.
					₹	۶	.423	ŀ	. 421	.421	. 421	. 421	.421	. 421	. 421	. 421	Į	.422	. 422	. 422	. 422	.422	. 422	. 422	. 422	. 422	.422	l
			_			off	.011	600	900	600	.010	.009	600	. 010	010	.010	┝	60.	. 010	. 010	. 010.	. 010	.010	010	٥٠٠	0.0.	.010	ļ
					3	8	349	346	346	. 346	. 346	.346	.346	3,46	34.6	.346	346	3,46	.346	. 346	.346	346	346	346	346	. 346	.346	
		ê ê	ence		_	off	.015	.015	.015	.015	.015	.015	. 710.	.019	.017	. 017	. 017	.017	. 017	. 017	. 017	.017	.017	018	.018	.018	.018	
L TAGE	Ç	ker Mo	terfer	F2 ON	₹	ક	.353	.352	.352	.352	.352	.351	349	348	348	348	.343	.334	.320	300	. 297	. 279	. 287	. 289	. 569	. 244	. 251	
LAMP VOLTAGE	(VAC)	(Middle Marker Node)	1300 Hertz Interference	F1 AND		off	.013	.013	.013	.013	.013	.013	510.	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	-
-		(Nick	300		Æ	۶	.350	.350	.350	.350	.350	.350	.350	.350	.350	.350	.350	.350	.350	350	350	.350	.350	.350	.350	.350	.350	
			_			off	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	
					*	۶	.350	.350	.350	.350	.350	.350	.350	.350	.350	.350	.350	.351	.351	.351	.351	.351	.351	.351	.351	.351	.351	
					-	off	.011	9.	.011	<u>.0</u>	<u>.</u>	.01	110.	.011	.011	10.	.011	10.	.011	5.	9	.011	.011	.011	.011	10.	<u></u>	
					75	ક	.242	722.	.236	.23 <b>6</b>	236	236	.235	.235	.235	.235	.235	.235	234	.2 72.	.234	.234	.234	.234	.234	.233	.233	
<b></b>		lode)	rence	3	₹	ŧ	.015	.015	.015	210.	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	95	.015	.015	.015	.015	.e.	.03 25	
LAMP VOLTAGE	(VAC)	(Outer Marker Mode)	400 Hertz Interference	F1 AND F2 ON	ه.	ક	% %	<u>ي</u> کڙ	.236	% %	722.	.237	.247	.245	.240	.246	.248	.254	.253	230	.255	.251	672.	.257	.256	122.	.246	
LAMP	J	uter M	Hertz	FIA	Œ	off	.014	.014	.014	.014	.014	,0: 4:0:	.014	<b>710</b> .	.014	710.	70.	.014	,014 1	.014	70.	.014	.014	.0.	.014	·014	.04	
		ē	907			٤	:23	<u>g</u>	<u>8</u>	<u>ين</u>	8	£5.	£23.	.23	.233	.233	.232	22.	.232	22.	222	.232	.232	.232	232	.232	.232	0.0
					¥	÷ o	.e.	.013	:01	.013	:03	.03	.013	.013	.013	.013	.013	.013	.013	:03	.013	.013	.013	.013	.03	.03	.e.	
						8	2,5	.241	2	.24	97.	.20	3%	.239	82	ž.	82.7	82.	<u>ين</u>	<u>ي</u>	2	.237	.237	727	.237	% %	% %	
		F1/F2	Signal	Level			Basel ine	9	ž	ĕ	ķ	۶.	51-	7-	:13	-12	F	-10	ô	89		9.	-5	7-	ŗ	?	-	,

DESENSITIZATION EFFECT ON MARKER RECEIVER NUMBER FOUR'S LAMP VOLTAGE (INTERFERENCE: F1 ONLY)

Ode)  Fence  Of	,				ANA	LAMP VOLTAGE							LAMP VOLTAGE	LTAGE			┢			-	LAMP VOLTAGE	TAGE			
COuter Marker Node    Couter Marker Node    1300 Mertz Interference					Š	AC)							Š	េ							(VAC)	G			
Hole Hertz Interference FI OM MD F2 OFF FI OM ADD F2 OFF FI OM ADD F2 OFF  While Hert Interference FI OM ADD F2 OFF FI OM ADD F2 OFF  While Hert Interference  While Hert I	~			ē	ter Ma	rker M	Sqe					Caid	lle Mari	ker Mac	æ					(Inne	r Mark	(Inner Marker Mode)	<u>ء</u>		_
Harmon   H	<u>-</u>			¥ 007	ertz li	nterfe	ence				_	1300 He	irtz Ini	terfere	auce				M	000 Ke	rtz In	3000 Hertz Interference	e)Ce		
An         FM         FM         CD         AN         FM         CD         OFF	<u>.</u>		ľ		8	8 F2 (							OF AN	F2 OF	<u>.</u>					F1	ON AN	F1 ON AND F2 OFF			
90         off         on         off         off         off         off		₹		Œ	_	æ	_	5	_	₹		Œ		Æ		3	_	₹	_	E		₹		3	
233         013         232         014         234         014         375         019         356         014         356 <th></th> <th>ı</th> <th>ŧ</th> <th>8</th> <th>ij</th> <th>8</th> <th>off</th> <th>8</th> <th>off</th> <th>۶</th> <th>off</th> <th>8</th> <th>off</th> <th></th> <th>off</th> <th></th> <th>off</th> <th></th> <th>off  </th> <th>۶</th> <th>of t</th> <th>8</th> <th>off</th> <th>ક</th> <th>off</th>		ı	ŧ	8	ij	8	off	8	off	۶	off	8	off		off		off		off	۶	of t	8	off	ક	off
233         013         222         014         224         014         234         014         356         014         355         014         357         014         356         014         357         014         355         014         359         014         355         014         357         014         355         014         357         014         355         014         356         014         355         014         355         014         355         014         355         014         355         014         355 <th>E 3</th> <th></th> <th>.013</th> <th></th> <th>.014</th> <th>.234</th> <th>.014</th> <th>.241</th> <th>.011</th> <th>.372</th> <th>.013</th> <th>l I</th> <th>L.</th> <th>l</th> <th>Ľ</th> <th></th> <th>010</th> <th></th> <th>┞</th> <th>.427</th> <th>710</th> <th>.445</th> <th>915</th> <th>418</th> <th>010</th>	E 3		.013		.014	.234	.014	.241	.011	.372	.013	l I	L.	l	Ľ		010		┞	.427	710	.445	915	418	010
233         013         232         014         234         014         234         014         234         014         234         014         234         014         236         014         336 <th>9</th> <td></td> <td><u>8</u></td> <td></td> <td>.014</td> <td>.234</td> <td>.014</td> <td>.239</td> <td>110.</td> <td>.368</td> <td>.013</td> <td></td> <td>_</td> <td>1</td> <td>┞</td> <td>i i</td> <td>_</td> <td></td> <td><u> </u></td> <td>. 426</td> <td>.014</td> <td>. 440</td> <td>.015</td> <td>616</td> <td>99</td>	9		<u>8</u>		.014	.234	.014	.239	110.	.368	.013		_	1	┞	i i	_		<u> </u>	. 426	.014	. 440	.015	616	99
233         013         232         014         235         014         236         011         367         016         356         014         236         011         367         014         356 <th>2</th> <td></td> <td>.013</td> <td></td> <td>.014</td> <td>.234</td> <td>.014</td> <td>.238</td> <td>.011</td> <td>.367</td> <td>.013</td> <td>l</td> <td>Ŀ</td> <td></td> <td><u> </u></td> <td>1</td> <td><b>-</b></td> <td></td> <td><del> </del></td> <td>. 426</td> <td>.014</td> <td>077</td> <td>.015</td> <td>418</td> <td>8</td>	2		.013		.014	.234	.014	.238	.011	.367	.013	l	Ŀ		<u> </u>	1	<b>-</b>		<del> </del>	. 426	.014	077	.015	418	8
233         013         232         014         235         014         356         014         355         014         350         010         421         011           233         013         232         014         235         014         235         014         356         014         356         014         350         010         421         013           233         013         232         014         235         014         235         014         352         014         350         010         421         013           233         013         232         014         242         014         235         014         352         014         350         010         421         013           233         013         232         014         243         014         235         014         235         014         352         014         350         010         421         013           233         013         232         014         243         014         352         014         352         014         352         014         352         014         353         014         353         014	2	- 1	:		-014		.014	.238	.011	li	.013			1	├-		┡	l	_	. 426	710	.439	.015	418	010
233         013         232         014         237         014         238         011         365         014         356         014         350         010         421         011           233         013         232         014         237         011         364         013         365         014         352         016         421         011           233         013         232         014         227         011         364         014         352         016         359         010         421         013           233         013         232         014         227         011         362         013         364         014         352         016         421         013           233         013         232         014         223         011         362         013         364         014         353         016         349         010         421         013           233         013         232         014         234         011         362         013         364         014         353         016         349         010         421         013           233 <t< td=""><th>2</th><td>ľ</td><td>:03</td><td>1</td><td>.014</td><td></td><td>.014</td><td>.238</td><td>.011</td><td>1</td><td>_</td><td></td><td><math>\vdash</math></td><td></td><td><b>—</b></td><td>l</td><td><u> </u></td><td>l</td><td>1</td><td>. 426</td><td>014</td><td>.438</td><td>.015</td><td>l</td><td>8</td></t<>	2	ľ	:03	1	.014		.014	.238	.011	1	_		$\vdash$		<b>—</b>	l	<u> </u>	l	1	. 426	014	.438	.015	l	8
233         013         232         014         237         011         364         013         365         014         352         014         350         010         421         011         362         013         364         014         350         010         421         013           233         013         232         014         235         014         236         013         364         014         350         010         421         013           233         013         232         014         236         011         362         013         363         014         349         010         421         013           233         013	2	- 1			.014	1	-		.011	1	Н		Ь.	1 1	├-		-	1	-	.426	.014	.437	.015	.418	010.
233         013         232         014         237         011         354         013         355         014         350         016         350         016         350         016         350         011         364         011         364         011         364         011         365         013         364         014         353         016         349         010         421         013           .233         .013         .232         .014         .237         .011         .362         .013         .364         .014         .353         .016         .349         .010         .421         .013           .233         .013         .232         .014         .234         .011         .362         .013         .363         .014         .353         .014         .379         .010         .421         .013           .233         .013         .232         .014         .246         .014         .364         .013         .343         .014         .421         .013           .233         .013         .232         .014         .236         .011         .362         .014         .343         .016         .349         .010         .	2	ı	10.	- 1	70.		.014	.237	.011				_	ľ	<u> </u>		<u> </u>	1	<b> </b>	. 426	710	.437	.322	418	910
233         013         232         014         237         011         363         014         354         014         350         016         350         016         349         010         421         013           233         013         232         014         237         011         362         013         364         014         353         016         349         010         421         013           233         013         232         014         235         011         362         013         364         014         353         016         349         010         421         013           233         013         232         014         236         011         362         013         363         014         349         010         421         013           233         013         232         014         236         011         363         014         343         016         359         010         421         013           233         013         232         014         236         011         343         014         349         010         421         013           233 <t< td=""><th>•</th><td></td><td></td><td></td><td>_</td><td></td><td>.014</td><td>.237</td><td>.011</td><td></td><td>.013</td><td></td><td>Ь.</td><td></td><td>⊢</td><td>l</td><td>ļ</td><td>Į</td><td>╙</td><td>426</td><td>70.</td><td>436</td><td>.316</td><td>418</td><td>9</td></t<>	•				_		.014	.237	.011		.013		Ь.		⊢	l	ļ	Į	╙	426	70.	436	.316	418	9
.233         .013         .232         .014         .235         .014         .235         .014         .235         .014         .235         .014         .345         .014         .353         .014         .353         .014         .351         .014         .352         .013         .345         .014         .351         .016         .349         .010         .421         .013           .233         .013         .232         .014         .245         .011         .345         .014         .349         .016         .421         .013           .233         .013         .232         .014         .245         .011         .346         .014         .349         .010         .421         .013           .233         .013         .232         .014         .236         .011         .346         .014         .349         .010         .421         .013           .233         .013         .232         .014         .236         .011         .349         .014         .349         .010         .421         .013           .233         .013         .232         .014         .236         .011         .349         .014         .241         .013	2		<u>8</u>	J	-	.243	_	.237	.011		_		_	1	_	1	—	1	┡-	. 426	70.	.435	.317	418	950
.233         .013         .232         .014         .342         .013         .343         .014         .351         .014         .351         .014         .351         .014         .351         .014         .351         .014         .349         .010         .349         .010         .421         .013           .233         .013         .232         .014         .246         .014         .236         .013         .364         .014         .349         .010         .421         .013           .233         .013         .232         .014         .236         .011         .361         .013         .363         .014         .349         .010         .421         .013           .233         .013         .232         .014         .236         .011         .360         .013         .343         .014         .349         .010         .421         .013           .233         .013         .232         .014         .236         .011         .360         .013         .342         .014         .349         .010         .421         .013           .233         .013         .232         .014         .236         .013         .342         .014	~	ŀ		- 1	-	ſ	.014	.237	9.		_				┝		$\vdash$	l '	-	. 426	.014	1,74	.317	418	010
.233         .013         .232         .014         .246         .014         .236         .011         .362         .013         .364         .016         .349         .016         .350         .010         .421         .013           .233         .013         .232         .014         .247         .016         .236         .011         .361         .013         .363         .014         .346         .010         .349         .010         .349         .014         .349         .010         .421         .013           .233         .013         .232         .014         .254         .014         .236         .013         .343         .014         .349         .010         .421         .013           .233         .013         .232         .014         .236         .011         .360         .013         .362         .014         .349         .010         .421         .013           .233         .013         .232         .014         .235         .011         .359         .013         .362         .014         .267         .014         .249         .010         .421         .013           .233         .013         .232         .014	_		-	J	-	ı	-	.236	.01				_	1	_	1 1	$\vdash$		_	. 426	.014	.433	.315	.418	010.
233         013         232         014         247         014         236         011         361         013         363         014         346         016         346         016         346         016         346         017         346         019         343         014         343         014         349         010         421         013           .233         .013         .232         .014         .254         .014         .236         .011         .360         .013         .363         .014         .349         .010         .421         .013           .233         .013         .232         .014         .255         .014         .235         .011         .360         .013         .362         .014         .269         .017         .349         .010         .421         .013           .233         .013         .232         .014         .235         .011         .359         .013         .362         .014         .269         .010         .421         .013           .233         .013         .232         .014         .235         .011         .359         .013         .349         .014         .221         .013	٥	- 1		J	_	- 1	9.	.236	<u>10</u> .		_	- 1					$\vdash$		<b>—</b>	.426	.014	. 433	.312	.418	99
233         013         232         014         324         010         343         014         343         014         343         016         349         019         343         014         343         014         341         017         349         010         421         013           .233         .013         .232         .014         .254         .014         .235         .011         .360         .013         .362         .014         .341         .017         .349         .010         .421         .013           .233         .013         .232         .014         .255         .014         .235         .013         .362         .014         .269         .017         .349         .010         .421         .013           .233         .013         .232         .014         .235         .011         .359         .013         .362         .014         .267         .014         .279         .010         .421         .013           .233         .013         .232         .014         .235         .011         .358         .013         .349         .010         .421         .013           .233         .013         .232		- 1		J	-	ſ	┵	ı	5	ŀ	$\blacksquare$		$\blacksquare$		ш		_		_	. 426 .	.014	.433	.309	.418	010.
233         013         .232         .014         .254         .014         .236         .013         .363         .014         .341         .017         .349         .010         .421         .013           .233         .013         .232         .014         .255         .014         .235         .011         .350         .013         .362         .014         .259         .014         .235         .011         .359         .013         .362         .014         .269         .017         .349         .010         .421         .013           .233         .013         .232         .014         .235         .011         .359         .013         .362         .014         .267         .014         .349         .010         .421         .013           .233         .013         .232         .014         .235         .011         .358         .013         .361         .014         .239         .017         .349         .010         .421         .013           .233         .013         .232         .014         .235         .011         .358         .013         .349         .010         .421         .013           .233         .013		- 1	-4	J	-	ſ	-		9		93	ı		1			_	-	Į	. 426	.014	. 433	.305	.418	90.
.233         .013         .232         .014         .235         .011         .340         .013         .342         .014         .349         .010         .421         .013           .233         .013         .232         .014         .235         .011         .359         .013         .362         .014         .269         .017         .349         .010         .421         .013           .233         .013         .232         .014         .235         .011         .359         .013         .361         .014         .265         .014         .235         .011         .359         .013         .361         .014         .245         .010         .421         .013           .233         .013         .232         .014         .235         .011         .358         .013         .361         .014         .239         .010         .421         .013           .233         .013         .232         .014         .235         .011         .358         .013         .361         .014         .239         .010         .421         .013		- 1	-4	J	-	ſ	-		<u>1</u>		.013								_	. 426 .	.014	.437	.300	.418	90.
.233         .013         .232         .014         .255         .011         .359         .013         .362         .014         .269         .017         .349         .010         .421         .013           .233         .013         .232         .014         .255         .014         .235         .011         .359         .013         .361         .014         .267         .014         .349         .010         .421         .013           .233         .013         .232         .014         .254         .014         .235         .011         .358         .013         .361         .014         .239         .017         .349         .010         .421         .013           .233         .013         .232         .014         .235         .011         .358         .013         .361         .014         .200         .017         .349         .010         .421         .013		1	-	- 1	-		-	اہ	5		-				$\vdash$				$\vdash$	. 426	.014	. 440	082	.418	010
.233 .013       .232 .014       .255 .014       .235 .011       .359 .013       .362 .014       .267 .014       .349 .010       .421 .013         .233 .013       .232 .014       .254 .014       .235 .011       .358 .013       .361 .014       .245 .014       .349 .010       .421 .013         .233 .013       .232 .014       .256 .014       .235 .011       .358 .013       .361 .014       .239 .017       .349 .010       .421 .013		ı		- 1	-	- 1			티		_	i	_		_		_		_	. 426 .	.014	.420	. 274	. 418	010.
.233 .013       .232 .014       .254 .014       .235 .011       .358 .013       .361 .014       .245 .014       .349 .010       .421 .013         .233 .013       .232 .014       .256 .014       .235 .011       .358 .013       .361 .014       .200 .017       .349 .010       .421 .013	$\dashv$	- 1		·	_	ĺ	-	_	10.		ij				┝		$\vdash$		<u> </u>	. 426	.014	.391	. 244	.418	010
.233 .013 .232 .014 .246 .014 .235 .011 .358 .013 .361 .014 .239 .017 .349 .010 .421 .013 .233 .013 .232 .014 .256 .014 .358 .013 .361 .014 .200 .017 .349 .010 .421 .013	┪	l	_	- 1		- 1			5			. 1	-			]	_			. 426	.014	360	. 212	.418	010
.233 .013 .232 .014 .256 .014 .235 .011 .358 .013 .361 .014 .200 .017 .349 .010 .421 .013		l	_1	- 1		- 1	-		5	- 1	_		$\Box$		_		_		_	. 426	.014	.343	. 159	.418	010
	1	l		- 1	-		-	_				. (				1 1	-	l i	$\vdash$	. 427	.014	. 307	.032	.418	010
0 233 .013 .232 .014 .239 .014 .235 .011 .357 .013 .361 .014 .229 .017 .350 .010 .421 .013	$\dashv$	l		- 1	_				-		_		_						_	. 727	.014	. 182.	.078	.418	010

DESENSITIZATION EFFECT ON MARKER RECEIVER NUMBER FOUR'S LAMP VOLTAGE (INTERFERENCE: F2 ONLY)

				98	LAW VOLTAGE							LAMP VOLTAGE	LTAGE			_			5	LAMP VOLTAGE	TAGE	l		
				Š	(VAC)							(VAC)	G							(VAC)	c			
F1/F2			3	ter Ha	(Outer Harker Hode)	(eg					(Nick	(Middle Marker Mode)	ker Ma	<b>ફ</b>					(Jrner	Marke	(Inner Narker Mode)	_		
Signal			¥ 00 <b>7</b>	ertz 1	400 Hertz Interference	rence					1300 He	1300 Hertz Interference	terfer	ence				ಹ	300 Ker	tz Int	3000 Hertz Interference	e		
Level			•	1 OFF	F1 OFF AND F2 ON	8					14	F1 OFF AND F2 ON	<b>10</b> F2 (	8		+		ŀ		OFF AN	F1 OFF AND F2 ON	_		Т
	₹		E	Ī.	₹	Ţ	3		~	₹	FH	_	₹		3	_	₹		£		£		3	
	8	off	8	off	8	off	8	off	ક	off	8	off	۶	off	ક	off	8	off	8	<b>3</b>	o	off	8	ŧ
Basel ine	.233	.013	.232	70.	1241	.013	23.	.01	.355	<u>8</u>	.359	.014	.358	.013	. 350	.010	. 421	.013	. 426	.014	.422 .0	.013 .418	ı	8
9,	.233	55	232	ă	.240	.013	<u>بي</u>	.01	.353	.e.	.357	.014	.356	.013	349	.010	. 420	.013	425	.0.	.423 .0	.013	. 417	99
35	.233	.03	.232	710.	.240	.013	.233	.01	.353	.013	.357	.014	.355	.013	.349	.010	.420	.013	.425	76.	.423 .0	.013	. 417	99
ä	.233	.03	.232	, 10.	.240	.013	233	.01	.353	.013	.357	.014	.355	.013	.349	.010	. 421	.013	.425	.04	.423 .0	.013	. 418	8
Ş	.233	.03	.232	.014	.240	.03	.233	10.	.353	.e.	.357	.014	.355	.013	349	.010	.421	.013	. 425	76.	. 623	.013	. 418	99
Ŗ	.233	.03	.232	9	125.	.013	82.	10.	.353	.013	.357	.014	.356	.013	349	8	.421	.e.	.425	.04	. 423 .0	<b>7.</b> 210.	.418	음
-15	.233	.013	_	710.	.245	.03	233	19.	.353	.03	.357	710.	. 356	.013	.349	. 010	.421	.013	.425	.014	. 423	752	. 418	흥
7	8	.03	٠.,	710.	243	.e.	.233	.011	.353	.013	.357	.014	.351	.013	.349	.010	.421	.013	. 425	76.	. 423	7. 672.	. 418	010
5	.233	e.	.232	,0.	.244	.013	.233	19.	.353	.03	.357	.014	.350	.013	.349	.010	. 420	.03	. 425	.014	. 423	7. 672.	. 417	흥
-12	.233	.013	.232	ě	.246	.013	.233	.01	.353	.013	.357	.014	357	.015	349	.010	.420	.013	. 525	.04	.423 .2	.247	. 417	9
=	233	.03		410.	.237	.03	.233	.01	.353	219.	.357	.014	.344	070.	349	.010	.421	.013	.426	76.	. 423	4. 545.	. 418	99
9	125	013	┿	,01	244	.013	.233	110.	.353	.03	.357	.014	.351	_	349	.011	.421	.013	426	.014	. 423	242 .4	.418	9
٩	82	.013	┺	,01¢	777.	.013	.233	.01	.353	.013	.357	.014	349	.082	349	.010	.421	.013	. 426	.014	.424	4. 152.	. 418	010
8	.233	25.	.232	710.	.251	.013	.233	110.	.353	.013	.357	.014	.353	.048	.349	.010	.421	013	.425	.04	. 425	4. 915.	.418	읭
	233	.013	<u> </u>	.014	752.	.013	.233	.011	.353	.013	.357	.014	.351	.016	349	.010	.421	013	. 425	770.	. 425	.211	.418	010
٥	.233	.013	.232	.014	.266	.013	.233	.01	.353	.013	.357	.014	.346	.016	349	010	.421	93	.425	9	. 425	4. 815.	. 418	99
٠	.233	.9	┺	710.	.274	.013	.233	.01	.353	.013	.357	.014	.329	.016	349	.011	.421	.013	.425	76	. 114.	4. 855.	.418	8
7	.233	.013	.232	.014	.240	.013	.233	.01	.353	.013	.357	.014	.255	.016	349	.011	.421	013	. 425	.04	. 400	7. 822	. 418	99
7	.233	.013	.232	.014	.278	.013	.233	10.	.353	.013	.357	.014	.225	.016	349	.011	.421	.013	.425	.014	395 .2	. 235	.418	99
?	.233	.013	.232	710.	.246	.013	.233	.01	.352	.013	.357	.014	.211	.016	.349	10.	.421	.03	.425	.014	.385 .2	. 233	.418	99
7	233	.013	232	.014	.240	.013	.233	.011	.352	.013	.356	.014	.124	.017	349	10.	.420	.013	. 425	70.	369	. 722.	.418	950
0	.233	.013	.232	.014	.241	.013	.233	.011	.352	.013	.356	710.	.271	.017	349	5	.420	.013	.425	.014	.365 .2	. 205	. 418	99

DESENSITIZATION EFFECT ON MARKER RECEIVER NUMBER FIVE'S LAMP VOLTAGE (INTERFERENCE: F1 AND F2)

	_			186	LAMP VOLTAGE						[ ]	LAMP VOLTAGE	TAGE			T				LAMP VOLTAGE	LTAGE			
				Ξ	(ADC)							CADC	æ							(VOC)	3			
F1/F2			<u>e</u>	iter M	(Outer Marker Mode)	lode)			_		(Nigh	(Middle Marker Mode)	er No.	de)						r Mark	(Inner Marker Mode)	ລ		
Signet			904	lertz	400 Hertz Interference	rence				_	300 He	1300 Hertz Interference	erfer	Price				m	3000 Hertz Interference	rtz In	terfer	auce		_
Level				FIAN	F1 AND F2 ON	3					1	F1 AND F2 ON	F2 ON						_	F1 AND	F1 AND F2 ON			
		¥		F	•	£	ن 	5	*	-	¥.		풒		3		₹		歪		₹.		3	
	٤	off	٤	off	۶	off	ક	off	۶	off	۶	off	8	off	8	off	8	off	۶	off	۶	off	۶	off
Basel ine	.es	8.8	<u>ş</u>	8.98	.834	9.05	.863	8.96	.792	9.00	784	9.00	. 786	9.0%	8008	8.95	. 791	8.93	, 78°,	9.00	. 785	8.91	808.	8.96
07	8	8.97	28.	9.01	.826	9.03	.842	8.99	.782	9.03	.782	9.05	. 785	9.04	8 067.	8.98	783 8	8.98	. 782	9.05	.784	8.95	.796	9.05
-35	S.	8.97	8	9.0	.832	9.05	.653	8.98	.784	9.03	. 783	9.01	. 786	9.0%	. 792 8	8.98	786 8	8.97	. 785	9.05	. 787	8.95	662.	9.01
Š	ş	8.97	828	8.8	836	9.05	.856	8.98	.785	9.05	. 784	9.01	786 9	9.03	. 793 8	8.98	.786 8	8.97	9 982.	9.01	. 787	8.95	800	9.01
Ś	9. 0.20	8.97	.830	9.00	.832	9.05	.854	8.97	. 785	9.05	.784	9.01	9 987.	9.03	. 793 8	8.98	.786 8	8.97	286.9	9.01	787.	8.95	908	9.01
92	2	8.97	636	9.8	788.	9.02	.855	8.97	.786	9.05	. 784	9.01	787	9.03	. 794 8	8.98	. 787 .	8.97	786 9	9.01	788	8.95	.801	9.00
-15	કુ	8.97	.830	9.0	.635	9.02	.859	8.97	.786	9.05	. 785	9.01	.788	9.03	8 267.	8.98	. 788 8	8.97	6 282	9.01	262.	8.96	.802	9.00
*1.	9. 03.	8.97	.832	9.6	.837	9.05	.857	8.97	787.	9.05	785	9.01	988.	9.03	% &	8.98	.788 8	8.97	787	9.01	ž	8.96	.802	9.00
5	2	8.97	.833	9.0	.836	9.02	.857	8.97	.787	9.02	. 785	9.01	. 788 9	9.03	. 795 8	8.98	.788 8	8.98	.787	9.01	8	8.96	.88.	9.0
-15	.844	8.98	33.	8.	.837	9.05	.858	8.97	787	9.05	.786	9.01	9 682.	9.03	8 %%.	8.98	.789 8	8.98	787 9	9.01	867.	8.96	208.	9.00
=	<u>ج</u>	8.8	.636	9.8	.837	9.05	178.	8.97	٠ <del>٣</del>	9.05	. 789	9.01	9 064.	9.02	8008.	8.98	. 794 8	8.98	. 792 9	9.01	798	8.96	.814	9.00
9	.956	8.98	2,8	9.0	.837	9.05	878	8.97	8	9.02	793	9.01	6 062.	9.02	806 8	8.99	. 798 8	8.98	6 662.	9.01	808	8.96	.831	9.00
٩	.85	8.98	.845	9.01	.839	9.05	.883	8.97	797	9.02	9 567.	9.01	. 792 9	9.02	807 8	8.99	801 8	8.98	9 008.	9.01	816	8.97	835 9	9.00
•	3	8.98	.87	9.0	25.	9.05	2885	8.97	8	9.05	. 794	9.01	. 793	9.02	809 8	8.99	802 8	8.98	.801 9	9.01	.809	8.97	. 841	9.00
,	ş	8.98	.850	9.01	.643	9.05	888.	8.97	.800	9.02	. 795	9.01	6 562.	9.02	8 118.	8.99	804 8	8.98	.803 9	9.01	159	8.97	.849	9.01
9	.872	8.98	.850	9.0	778.	9.05	.893	8.97	<b>908</b> .	9.05	5 262	9.01	. 798 9	9.02	.813 8	8.99	818 8	8.98	908	9.01	.844	8.97	798.	9.01
ç	.876	8.8	.855	9.0	.842	9.05	8	8.97	808	9.02	662.	9.01	.802 9	9.02	.817 8	8.99	.813 8	8.99	6 608.	9.01	8,46	8.97	894 9	9.01
4-	<b>8</b> 80	8.98	.859	9.0	.854	9.05	8	8.97	118.	9.02	.801	9.02	.806	9.02	.823 8	8.99	.819 8	8.99	.814 9	9.01	880	8.97	989	9.01
÷	836	8.98	3	9.01	.857	9.05	.919	8.98	.820	9.02	.805	9.02	.818 9	9.02	.831 8	8.99	1.27 8	8.99	.821 9	9.01	939 8	8.97	1.18	9.01
?	8.	8.98	678	9.0	.858	9.05	.935	8.98	.842	9.02	.810 9	9.02	.830 9	9.02	8 778.	8.99 2	2.13 8	8.99	.835 9	9.01	1.04 8	8.97	1.46 9	9.00
-	.933	8.8	2885	9.0	2865	9.05	.959	8.98	.992	9.02	.818	9.02	.873 9	9.02 .8	8 698.	8.99 2	2.35 8	8.99	.889	9.01	1.33 8	8.97	1.80 9	9.00
0	18	8.8	99	9.01	2882	9.05	1.0	8.98	1.19	9.05	.832 9	9.02 1.	1.14 9	9.02	.941 8	8.99	1.92 8	8.98	1.15 9	9.01	1.73 8	8.97 2	2.24	9.00

DESENSITIZATION EFFECT ON MARKER RECEIVER NUMBER FIVE'S LAMP VOLTAGE (INTERFERENCE: F1 ONLY)

(NDC)  Table Harker Hode)  Table Green  Table Harker Hode)  Table Green  Table Harker Hode)  Table Green  Table Harker Hode)  Table Green  Table Harker Hode)  Table Green  Tabl					×   •	LAW VOLTAGE							LAMP VOLTAGE	<b>JLTAGE</b>			ŕ			_	LAMP VOLTAGE	LTAGE			
Coulter Native Hode    Coulter Native Hode	_				Z	<b>6</b>							Z	Ç)			,				S	G			
Figurator   Figu	/F2			ğ	er Ma	rker M	ode)					CRÍC	de Ka	rker M	(ap					Cime	r Mark	er Mod	<b>•</b>		
THE CONTRIVING PROPERTY OF THE CONTRIVING PROPET	Jeca			400 He	rtz 1	nterfe	rence				*	1300 H	ortz Ir	nterfe	ence				F-7	3000 He	rtz In	terfer	euce		
cal         filt         print         print         filt         print         filt         print         prin	evel			Ξ	3	19 F2 (	OFF						A NO	ID F2 (	)FF				Ì		₹ B	0 F2		l	
646         687         688 <th></th> <th>₹</th> <th></th> <th>Į.≅</th> <th>Γ</th> <th>  ~</th> <th>_</th> <th>5</th> <th>-</th> <th>_</th> <th>×</th> <th>  ₹  </th> <th></th> <th>٤</th> <th>-</th> <th>ರ</th> <th>_</th> <th>₹</th> <th>_</th> <th>Ξ</th> <th>_</th> <th>Ξ</th> <th></th> <th>3</th> <th></th>		₹		Į.≅	Γ	~	_	5	-	_	×	₹ 		٤	-	ರ	_	₹	_	Ξ	_	Ξ		3	
646         6.70         6.84         6.70         6.84         6.70         772         9.02         778         9.01         778         9.02			of t		off	8	off	ક	off	8	off	8	off	۶	off	ક	off	ક	off	۶	÷,	8	ŧ	8	off
641         642         6.03         682         6.03         778         9.0	el in	8	8	1	8		8.8	786.	8.97	28.	9.05	Į	8.97	88.	9.01	.80	9.00	1	8.97		_			- 1	8
1879 9.00   1834 9.02   1842 8.99   1879 9.03   1785 9.00   1785 9.00   1785 9.01   1785 9.02   1785 9.01   1885 9.03   1785 9.01   1885 9.03   1785 9.01   1885 9.03   1785 9.01   1885 9.03   1785 9.01   1885 9.03   1785 9.01   1885 9.03   1785 9.01   1885 9.03   1785 9.01   1885 9.03   1785 9.01   1885 9.03   1785 9.01   1885 9.03   1785 9.03   1785 9.01   1885 9.03   1785 9.03   1785 9.03   1885 9.03   1885 9.03   1885 9.03   1885 9.03   1885 9.03   1885 9.03   1885 9.03   1885 9.03   1885 9.03   1885 9.03   1885 9.03   1885	9	.831	+	1	9.03	ı	8.8	<b>3</b> 9.	9.05	£.	9.6	ı	8.8	286	9.03	8.	9.03	.793	9.07		_		-	ı	8
841         9.00         884         9.02         1854         9.02         1785         9.02         1785         9.02         1785         9.02         1785         9.02         1789         9.03         1789         9.03         1789         9.03         1789         9.03         1789         9.03         1789         9.03         1789         9.03         1789         9.03         1789         9.03         1	3 3	ı	┺-	1	9.05	2%	8.8	856	9.01	787.	9.03	ł	8.8	288	9.05	86.	9.03	1	9.06	1	-		-		9.03
68.0         68.0         6.0         6.0         6.0         7.0 </td <th>S</th> <td>•</td> <td>┺-</td> <td>1</td> <td>9.05</td> <td></td> <td>8</td> <td>.857</td> <td>9.01</td> <td>882.</td> <td>9.03</td> <td>1</td> <td>8.</td> <td>788</td> <td>9.05</td> <td>&amp;</td> <td>9.02</td> <td>1 1</td> <td>9.05</td> <td>li</td> <td><math>\vdash</math></td> <td>l i</td> <td></td> <td>- 1</td> <td>9.03</td>	S	•	┺-	1	9.05		8	.857	9.01	882.	9.03	1	8.	788	9.05	&	9.02	1 1	9.05	li	$\vdash$	l i		- 1	9.03
840         8.56         6.10         .786         9.01         .789	S	l l	₩	1	6.0		8.8	98	9.01	88.	9.03	1	9.8	.788	9.01	& &	9.05	1	9.04				-	- 1	9.03
640         6.00         6.00         785         9.	2		╄—	1	9.01		8.8	8	9.01	788	9.03		9.00	.789	9.01	&	9.05	1	9.6		-	- 1		- 1	9.03
640         69.99         68.99         68.99         68.99         68.99         68.90         69.00         778         9.01         180         9.02         778         9.04         779         9.01         789         9.01         180         9.02         779         9.01         789         9.01         180         9.02         779         9.04         779         9.01         789         9.01         180         9.02         779         9.04         779         9.01         789         9.01         180         9.02         779         9.03         779         9.01         180         9.02         779         9.03         779         9.01         180         9.02         779         9.03         779         9.01         180         9.02         779         9.03         779         9.01         180         9.02         180         9.02         779         9.03         779         9.01         180         9.02         180         9.03         779         9.03         779         9.03         779         9.03         779         9.03         779         9.03         779         9.03         779         9.03         779         9.03         779         9.03	5		-	1	50.0	1	8.8	.858	9.6	.789	9.03	ľ	8.6	.789	9.01	900	9.05	l i	9.6		_	1		- 1	9.03
841         8.99         6.81         7.89         9.01         7.89         9.01         7.89         9.01         8.89         9.01         8.89         9.01         8.89         9.01         7.89	2	1	-	1	9.0		8.	.858	8.8	8	9.03		8.8	.789	9.01	.800	9.05	1	9.0%		9.01		-		9.03
841         9.00         886         9.01         889         9.01         880         9.02         779         9.01         789         9.01         880         9.02         779         9.01         779         9.01         780         9.01         800         9.02         779         9.01         779         9.01         800         9.02         779         9.01         779         9.01         800         9.02         779         9.01         779         9.01         800         9.02         779         9.01         779         9.01         800         9.02         779         9.01         779         9.01         800         9.02         779         9.01         800         9.02         779         9.01         779         9.01         779         9.01         779         9.01         779         9.01         779         9.01         779         9.01         779         9.01         770         9.01         800         9.02         800         9.02         800         9.02         800         9.02         800         9.02         800         9.02         800         9.02         800         9.02         800         9.01         800         9.01         80	5	1	_	1	9.0		8.8	3	9.6	282	9.03		9.00	.789	9.01	900	9.05	1 1	9.04		9.01	- 1	+	- 1	9.03
857         9.00         .843         9.00         .789         9.01         .789         9.01         .789         9.01         .789         9.01         .789         9.01         .800         9.02         .799         9.01         .799         9.01         .800         9.01         .800         9.01         .800         9.01         .800         9.01         .800         9.01         .800         9.01         .800         9.02         .802         9.03         .796         9.01         .801         9.01         .804         9.01         .804         9.01         .802         9.02         .802         9.02         .802         9.02         .802         9.02         .802         9.02         .802         9.02         .802         9.02         .802         9.03         .794         9.03         .794         9.01         .794         9.02         .794         9.01         .794         9.02         .794         9.01         .794         9.02         .794         9.01         .794         9.02         .794         9.01         .794         9.02         .794         9.01         .794         9.02         .794         9.01         .794         9.00         .794         9.01	-12	1	—	1	5.0	l	8.8	99.	9.6	<b>8</b> 2.	9.03		8.8	.789	9.01	.800	9.05	1	9.04	- 1	9.0	ŀ		- 1	9.03
850         9.00         .643         9.01         .807         9.01         .807         9.01         .807         9.02         .802         9.03         .796         9.00         .793         9.01         .803         9.02         .803         9.03         .796         9.01         .793         9.03         .794         9.01         .803         9.01         .794         9.01         .794         9.01         .794         9.01         .794         9.01         .794         9.01         .803         9.02         .803         9.03         .794         9.01         .804         9.02         .803         9.03         .794         9.01         .804         9.02         .803         9.02         .803         9.01         .804         9.01         .804         9.01         .804         9.03         .794         9.00         .794         9.01         .804         9.03         .794         9.01         .794         9.03         .794         9.01         .794         9.01         .794         9.01         .794         9.01         .794         9.01         .794         9.01         .794         9.01         .794         9.01         .794         9.01         .794         9.01	=			1	9.0		8.	3	9.0	82.	9.03	1	8.6	.789	9.0	8.	9.05		9.03		9.01		-	ŀ	9.03
846         9.00         .844         9.01         .793         9.00         .793         9.01         .793         9.00         .794         9.00         .808         9.02         .803         9.02         .804         9.01         .804         9.01         .804         9.01         .804         9.01         .804         9.01         .794         9.00         .794         9.01         .804         9.02         .803         9.03         .797         9.01         .804         9.01         .804         9.02         .804         9.03         .797         9.01         .804         9.01         .804         9.03         .797         9.01         .804         9.01         .804         9.03         .797         9.01         .794         9.03         .794         9.01         .804         9.01         .804         9.01         .794         9.03         .794         9.01         .794         9.03         .794         9.01         .804         9.01         .794         9.03         .794         9.01         .804         9.01         .794         9.03         .794         9.01         .804         9.01         .804         9.01         .804         9.01         .804         9.01	۽	1		1	9.0	1	8.8	.874	9.00	. Z	9.03	į .	8.8	.793	9.01	709.	9.05	1	9.03		9.01			- 1	9.03
847         9.00         846         9.01         808         9.02         803         9.02         803         9.02         804         9.02         804         9.02         804         9.02         804         9.02         804         9.02         804         9.03         797         9.01         852         9.01         805         9.02         804         9.02         804         9.02         804         9.03         779         9.01         789         9.01         789         9.03         779         9.01         805         9.01         805         9.03         779         9.01         805         9.01         805         9.01         805         9.01         789         9.02         779         9.01         805         9.01         779         9.01         805         9.01         779         9.01         779         9.01         805         9.01         779         9.02         779         9.01         805         9.01         779         9.02         805         9.03         779         9.01         804         9.02         806         9.03         779         9.01         804         9.01         805         9.01         805         9.01         80	9		_	1	9.0		8.8	88	9.01	28.	9.03	Į I	9.00	28.	9.01	808	9.05	) ]	9.03		9.01	J	-+	- 1	5.03
653         9.00         643         9.01         643         9.02         680         9.02         680         9.02         680         9.02         680         9.02         680         9.03         779         9.01         851         9.01         817         9.01         817         9.01         817         9.01         817         9.01         851         9.01         817         9.01         851         9.02         800         9.01         817         9.01         852         9.01         817         9.01         852         9.01         817         9.01         817         9.01         800         9.01         827         9.01         852         9.01         827         9.01         800         9.01         800         9.01         800         9.01         800         9.01         800         9.01         800         9.01         800         9.01         800         9.01         800         9.01         800         9.01         800         9.01         800         9.01         800         9.01         800         9.01         800         9.01         800         9.01         800         9.01         800         9.01         800         9.01         80	-0			1	50.0		8.8	.874	9.01	<u>چ</u>	9.03	l	9.00	764	9.01	.808	9.05	.803	9.03	ı	5.0	- 1	-	ı	9.03
.853         9.00         .845         9.01         .779         9.00         .779         9.01         .817         9.01         .817         9.01         .819         9.02         .806         9.03         .779         9.01         .817         9.01         .817         9.01         .817         9.01         .817         9.01         .817         9.01         .819         9.01         .817         9.01         .811         9.02         .806         9.03         .779         9.01         .779         9.01         .779         9.01         .811         9.02         .806         9.03         .779         9.01         .811         9.02         .806         9.03         .779         9.01         .811         9.02         .806         9.03         .779         9.01         .814         9.02         .813         9.01         .817         9.01         .814         9.02         .813         9.01         .879         9.03         .804         9.01         .814         9.02         .813         9.01         .879         9.01         .814         9.02         .813         9.01         .879         9.01         .814         9.02         .813         9.03         .889         9.01 <th< td=""><th><u>۲</u></th><td></td><td>╄—</td><td>1</td><td>9.01</td><td>.83</td><td>8.99</td><td>.874</td><td>9.01</td><td>ž.</td><td>9.03</td><td></td><td>9.00</td><td>704</td><td>9.01</td><td>.809</td><td>9.05</td><td>86</td><td>9.03</td><td></td><td>-</td><td>- 1</td><td></td><td>- 1</td><td>9.03</td></th<>	<u>۲</u>		╄—	1	9.01	.83	8.99	.874	9.01	ž.	9.03		9.00	704	9.01	.809	9.05	86	9.03		-	- 1		- 1	9.03
.853         9.00         .847         9.01         .864         9.01         .819         9.01         .811         9.02         .806         9.03         .779         9.01         .811         9.02         .806         9.03         .779         9.01         .817         9.02         .817         9.01         .817         9.02         .817         9.02         .817         9.02         .817         9.02         .817         9.02         .817         9.02 <th< td=""><th>۹</th><td>1</td><td><del>-</del></td><td>1</td><td>0.0</td><td></td><td>8.</td><td>.873</td><td>9.01</td><td>ž.</td><td>9.03</td><td>ı</td><td>9.6</td><td>8</td><td>9.01</td><td>.810</td><td>9.05</td><td>908.</td><td>9.03</td><td>- 1</td><td>9.01</td><td></td><td>50</td><td>- 1</td><td>9.03</td></th<>	۹	1	<del>-</del>	1	0.0		8.	.873	9.01	ž.	9.03	ı	9.6	8	9.01	.810	9.05	908.	9.03	- 1	9.01		50	- 1	9.03
854         9.00         848         9.01         786         9.02         804         9.02         812         9.02         813         9.02         810         9.02         814         9.02         813         9.03         859         9.01         889         9.03         779         9.00         804         9.01         814         9.02         813         9.03         899         9.01         889         9.03         779         9.00         804         9.01         817         9.02         813         9.03         899         9.01         805         9.01         810         9.01         817         9.02         813         9.03         804         9.01         809         9.01         809         9.01         810         9.01         817         9.02         813         9.03         809         9.01         809         9.01         810         9.01         810         9.01         810         9.02         810         9.02         810         9.03         810         9.03         800         9.01         1.04         9.01         810         9.02         9.02         810         9.02         810         9.02         810         9.03         810         9	خ	1	-	1	9.01		8.8	8	9.01	28.	9.03		9.00	767.	9.01	.811	9.05	.806	9.03		_	- 1	-	ı	9.03
.855         9.00         .855         9.01         .855         9.00         .865         9.01         .817         9.02         .813         9.02         .813         9.01         .895         9.01         .779         9.03         .775         9.00         .802         9.01         .817         9.02         .819         9.03         .819         9.01         .817         9.02         .819         9.03         .875         9.00         .802         9.01         .817         9.02         .819         9.03         .804         9.01         .903         .903         .804         9.01 <th< td=""><th>4</th><td></td><td>₩.</td><td>1</td><td>9.0</td><td>8,8</td><td>8.8</td><td>88.</td><td>9.01</td><td>82.</td><td>9.03</td><td></td><td>9.00</td><td>.804</td><td>9.01</td><td>.812</td><td>9.05</td><td>1</td><td>9.03</td><td>1</td><td>9.01</td><td></td><td>1</td><td>- 1</td><td>9.03</td></th<>	4		₩.	1	9.0	8,8	8.8	88.	9.01	82.	9.03		9.00	.804	9.01	.812	9.05	1	9.03	1	9.01		1	- 1	9.03
.858         9.00         .852         9.01         .855         9.00         .862         9.01         .817         9.02         .817         9.01         .817         9.02         .817         9.01         .817         9.02         .818         9.01         .862         9.01         .824         9.01         .824         9.01         .824         9.01         .824         9.01         .824         9.01         .824         9.01         .824         9.01         .824         9.01         .824         9.01         .824         9.01         .824         9.01         .824         9.01         .824         9.01         .824         9.01         .824         9.01         .824         9.01         .824         9.01         .824         9.02         .824         9.01         .824         9.02         .824         9.01         .824         9.02         .824         9.01         .824         9.02         .824         9.02         .824         9.02         .824         9.02         .824         9.02         .824         9.02         .824         9.02         .824         9.02         .824         9.02         .824         9.02         .824         9.03         .824         9.03 <th< td=""><th>4</th><td></td><td></td><td>1</td><td>9.01</td><td>.83</td><td>8.8</td><td>88.</td><td>9.01</td><td>82.</td><td>9.03</td><td>۱ ۱</td><td>9.00</td><td>.804</td><td>9.01</td><td>.814</td><td>9.05</td><td>.813</td><td>9.03</td><td>ŀ</td><td>9.01</td><td></td><td></td><td>j</td><td>9.03</td></th<>	4			1	9.01	.83	8.8	88.	9.01	82.	9.03	۱ ۱	9.00	.804	9.01	.814	9.05	.813	9.03	ŀ	9.01			j	9.03
. 862 9.00 .853 9.01 .866 8.99 .889 9.01 .802 9.03 .797 9.00 .810 9.01 .824 9.02 .923 9.03 .810 9.01 1.42 9.01 1.18 9.01 1.18 9.00 .859 9.01 .863 9.00 .859 9.01 .864 9.01 .864 9.01 .864 9.01 .864 9.00 .866 9.00 1.18	->	1	↓	1	9.01	1851	8.8	.883	9.01	&	9.03		9.00	.802	9.01	.817	9.02	.819	9.03		9.01	- 1	}	- 1	9.03
868 9.00 .859 9.01 .863 9.00 .896 9.01 .806 9.03 .799 9.01 .824 9.01 .826 9.02 .923 9.03 .810 9.01 1.42 9.01 1.18	-		—	1	9.01	1	8.8	.889	9.01	.802	9.03		9.00	.810	9.01	.821	9.05	.832	9.03	- 1		- 1	-	- 1	9.03
			_	1	9.01	.863	9.0	% %	9.01	.806	9.03	. :	9.01	.824	9.01	.826	9.05	.923	9.03	- 1	_	1		. 18	9.03

DESENSITIZATION EFFECT ON MARKER RECEIVER NUMBER FIVE'S LAMP VOLTAGE (INTERFERENCE: F2 ONLY)

				LAND V	LAMP VOLTAGE						3	LAMP VOLTAGE	AGE			_			LARD V	LAMP VOLTAGE			
				3	(AOC)							(36)	_						E	(ABC)			
F1/F2			9	ter Ma	(Outer Marker Mode)	Ş					CHidd	(Widdle Marker Mode)	ir Mod	•				5	ner Mar	(Inner Marker Mode)	ş		
Signet			¥00*	ertz 1	400 Wertz Interference	ence.				-	300 He	1300 Hertz Interference	rfere	ace.				3000	Hertz 1	3000 Hertz Interference	ence		
Level				1 055	F1 OFF AND F2 ON	3						F1 OFF AND F2 ON	F2 0	_					F1 OFF	F1 OFF AND F2 ON	8		
		Į.	E	_	£		5	_	₹		Ξ		¥		3	_	₹		FH	Æ		3	_
	٤	off	ક	ŧ	ક	off	۶	off	۶	off	5	off	6	off	on off	8	off	ક	off	ક	off	ક	off
Basel ine	38.	8.8	.842	9.00	.853	8.96	698.	8.99	٠. اور	9.01	8 062.	8.99	.790 8.	8.94 .802	22 9.00	962.	9.01	88.	8.8	787.	8.89	.828	9.01
-40	% %	9.01	.827	9.05	.632	8.97	.848	9.03	.785	9.06	. 785 9	9.01	.787 8.	8.%	27 9.05	5 . 792	2 9.06	787	9.05	.783	8.93	118.	9.0
35	S	9.03	.834	9.05	.640	8.97	.859	9.03	787	9.03	. 787 9	9.01	.788 8.	8.96 .800	90.6 00	4 .795	5 9.05	. 789	9.01	785	8.93	.816	9.03
Ŗ	83	9.01	.835	9.05	.844	8.97	980	9.05	.787	9.03	. 787	9.01	.789 8.	8.96 .800	9.00	\$2.	5 9.05	8.	9.01	787.	8.94	.818	9.03
છ	8	9.01	.836	9.05	.844	8.97	198.	9.05	.787	9.03	9 287.	9.01 .788		8.96	9.03	35.	20.6	8.	9.01	787.	8.94	.819	9.03
ρ.	<u>يع</u>	9.0	.837	9.05	.837	8.97	.860	9.05	. 788	9.03	. 787	9.01	.789 8.	8.96	1 9.03	3.795	9.0%	82.	9.01	787.	%.8	.820	9.03
5	% 0%	9.01	.838	9.05	.847	8.97	.862	9.01	.788	9.03	788 9	9.01 789		8.96 801	11 9.03	3 .795	30.6	٤	9.01	.788	8.94	.822	9.03
7.	.642	9.01	.836	9.01	.844	8.97	.863	9.01	. 789	9.03	. 788 9	9.01	.789 8.	8.96 .801	1 9.03	3.735	9.0	ž.	9.01	!	8.94	.822	9.03
:13	3	9.	.837	9.01	.640	8.97	.862	9.01	. 789	9.03	. 788 9	9.01 789		8.96 .802	12 9.03	3.7%	20.0	٤.	9.01	82.	8.8	.823	9.03
-12	.82	9.0	.836	9.0	.849	8.98	.864	9.01	.789	9.03	. 788 9	9.01	790 8.	8.97 .802	12 9.03	3 . 796	5 9.03	28.	9.0	8.	8.94	.825	9.03
F	8,8	9.0	.844	9.01	8.	8.8	.873	9.01	.793	9.03	9 167	9.01	791 8.	8.97 .809	9 9.03	3 .805	9.03	767.	9.01	18.	8.5 5.	.857	9.03
9	.853	<u>9</u> .	.845	9.0	.844	8.98	.87	9.01	762.	9.03	. 792	9.01	792 8.	8.97 .810	0 9.03	3 .805	9.03	797.	9.01	.792	8.8	198.	9.03
ę.	28	9.6	.845	8.6	3	8.98	878	9.01	8	9.03	.792 9	9.01	792 8.97	118. 76	1 9.03	3 .806	9.03	.798	9.01	767.	8.95	.870	9.03
9	8	ē.	979	8.05	.854	8	88	9.0	8	9.03	.703 9	9.01	792 8.	8.97 .812	2 9.03	3 .810	9.03	.799	9.01	.796	8.95	.881	9.03
?	.858	9.0	848	9.05	.856	8.98	28.	9.0	862.	9.03	. 793 9	7.01	793 8.97	97 .814	4 9.03	3 .814	9.03	.800	9.01	.802	8.95	006	9.03
۴	85	ē.	.849	6.05	828	8.98	886	9.01	82.	9.03	794 9	9.01 .794	76 8.97	97 .816	6 9.03	828.	9.03	.802	9.01	.800	8.95	.938	9.03
ş	286	5.0	.853	9.05	.834	8.9	068	9.01	.802	9.03	. 795 9	9.01 .792		8.57 .819	9 9.03	806.	9.03	.804	9.01	908	8.9	<u>-</u> 0.	9.03
*	<b>3</b> 6	9.0	.856	9.05	.839	8.98	2895	9.01	708	9.03	. 797	9.01 .801	11 8.97	97 .823	3 9.03	1.10	9.03	.807	9.01	. 118.	8.8	1.12	9.03
÷	.874	<u>5</u>	.857	9.05	.871	8.98	8	<u>6</u> .0	.812	9.03	9 997	9.01 .809		8.57 .829	9 9.03	1.23	9.03	118.	9.01	.815	8.95	1.26	9.03
?	2885	9.0	.865	3.05	.871	8.98	2.	9.01	818	9.03	.801 9.	9.01 .806	6 8.97	97 .838	8 9.03	1.83	9.03	.816	9.01	. 840	8.95	1.44	9.03
-	8.	9.01	.872	6.05	848	8.98	.929	9.01	.865	9.03	.805 9.	9.01 .818	8 8.97	853	3 9.03	1.79	9.03	.825	9.01	.937	8.96	1.67	9.03
•	.925	9.01	.878	9.05	88.	8.98	.955	9.01	1.09	9.03	.810 9.	9.01 .802		8.97 .883	3 9.03	12.57	9.05	.859	9.01	1.52	8.96	1.95	9.03